Australian Personal Computer

ISSN 0725—4115 NZ $5.80 INCL. GST
REGISTERED BY AUSTRALIA POST PUBLICATIONS VBP 3691

June 1987 $3.95

AUSTRALIA'S TOP SELLING COMPUTER MAGAZINE

Compaq Portable III Benchtested — plus Silk, Cricket Draw, Aussie training package and a comparison of Kaypro and President offerings

Sorry, but your data base is now a victim of Evolution.

No wonder you're frustrated with your data base – it must feel like working with a dodo.

In the past, data bases have been sluggishly slow, difficult to fathom, and not very helpful.

Now, the good news:
The data base dinosaur is extinct.

Microsoft Rbase System represents a superior new generation in the history of the data base.

A *relational* data base for IBM personal computers (and other compatible species) that's smarter, faster and more powerful than any other to have roamed the planet.

Yet, thank goodness, its (r)evolutionary features are the very image of simplicity.

With Application Express, you can actually create your own specialised applications *without any programming.*

You see, all the programming aspects of Microsoft Rbase System are menu-driven: you can define your data base by simply filling in the blanks.

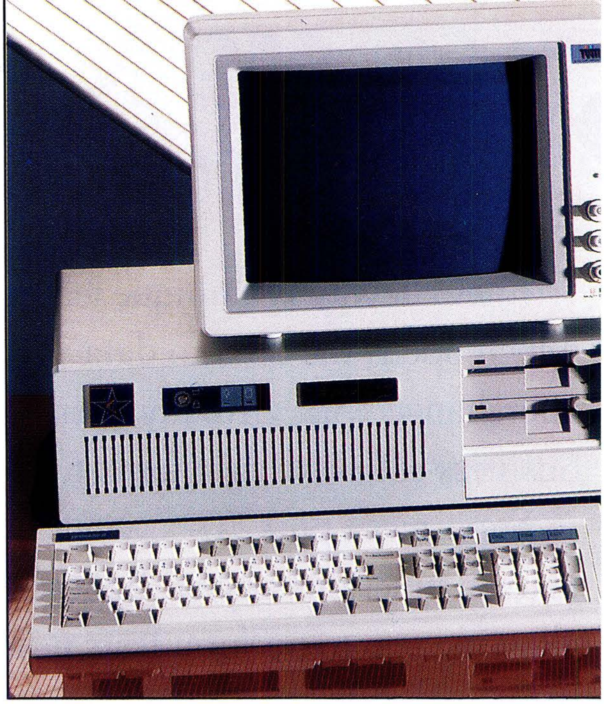
Similarly, Prompt-By-Example guides beginners through every feature without having to learn commands and syntax.

For the experienced user, a truly powerful programming language makes Microsoft Rbase System equally satisfying.

Importantly, ad hoc enquiry has never been so easy or so fast. Microsoft Rbase System's mighty brainpower makes your stored information infinitely *more meaningful* and, significantly, *more available.*

APC CONTENTS

Volume 8, Number 6, June 1987



REGULARS

Editorial *Managing Editor Sean Howard:* **Assistant Editor** Maria Bokic; *Consultant Editors* Steve Withers, Ian Davies. **Advertising** *Advertising Manager* Gerard Kohne. *NSW and Qld Sales Executive* Graeme Austin, Margaret Ensor (02) 264 1266; *Vic, SA, WA and Tas Sales Manager* Samantha Bates (03) 531 8411. **Production** Graphic Heart Pty Ltd. **Distribution** *Subcription Manager* Roula Tsitos (02) 264 1266; *Standard subscription rates Australia* $47 per annum, overseas A$80 (surface) A$184 (airmail); *Newstand sales:* Network Distribution Co. 54 Park Street, Sydney 2000.

Publishers Computer Publications Pty. Ltd. (a subsidiary of Consolidated Press (Holdings) Ltd.

Sydney Office: 215 Clarence Street, Sydney 2000; telephone (02) 264 1266; telex AA20514 CONPRES. **Melbourne Office:** 47 Glenhuntly Road, Elwood 3184; telephone (03) 531 8411; telex AA30333 'AMJ'.

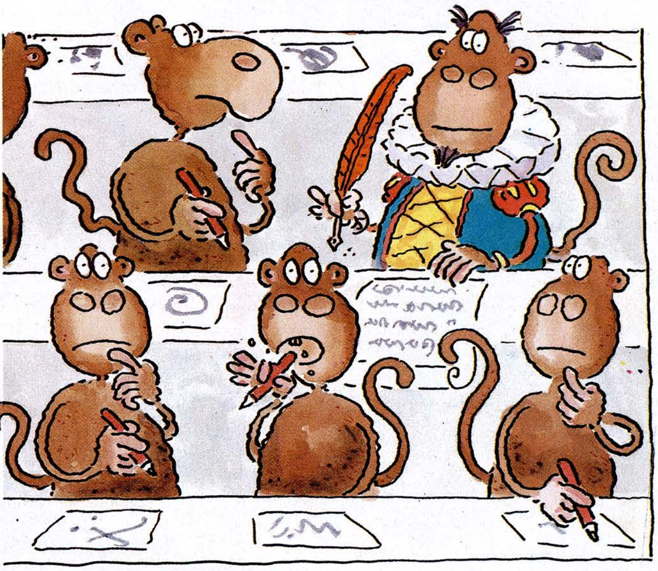
FEATURES

CONNECTIVITY

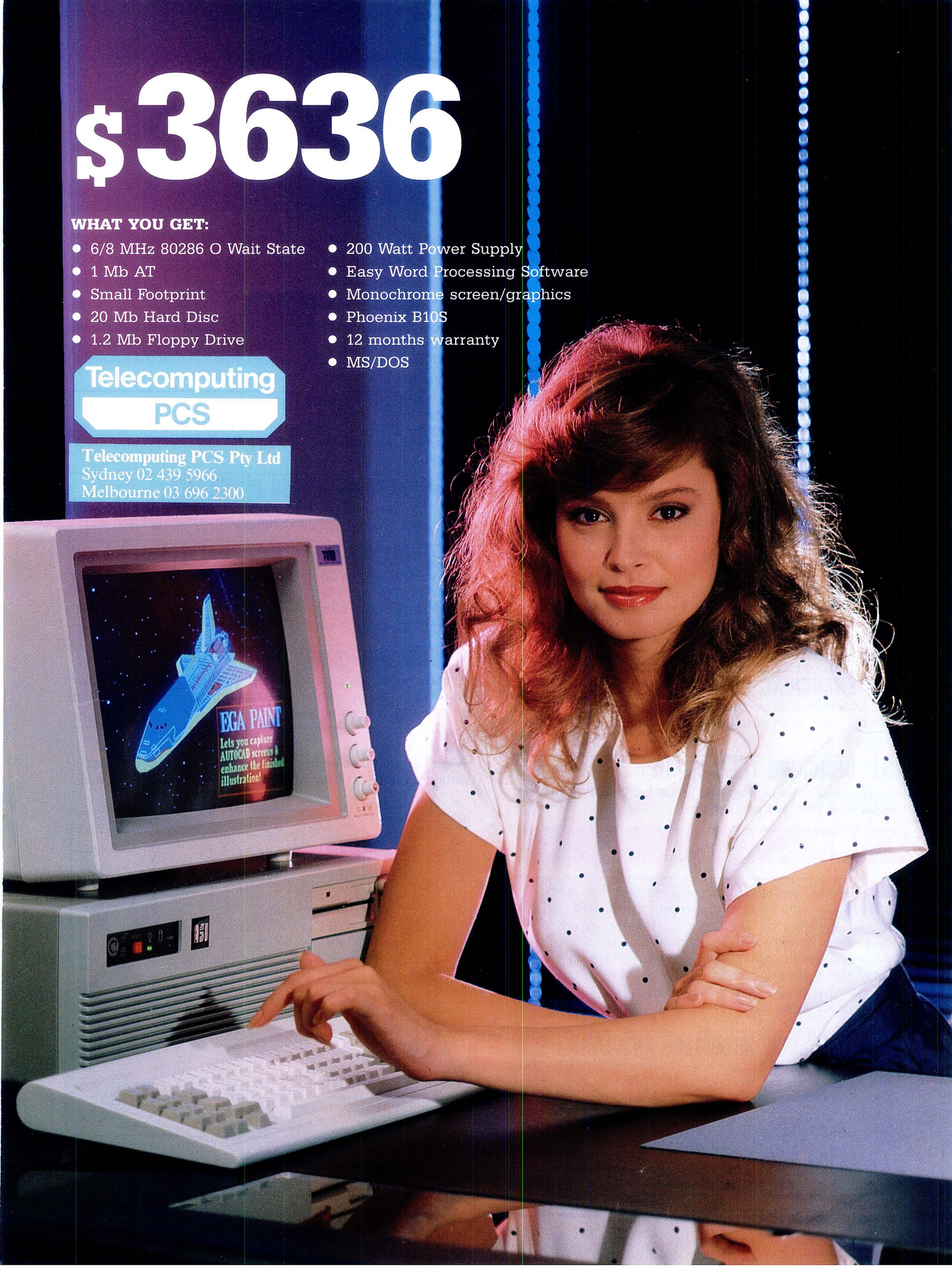
This month we launch a new section to *APC* — 'Connectivity'. It's concerned with all aspects of PC-based communications, networking and micro-to-mainframe links. Each month, this section will contain in-depth articles on one or more subjects concerned with connectivity, which starting next month, will be prefaced by a connectivity news column. Contributions, ideas and suggestions — as usual — are welcome.

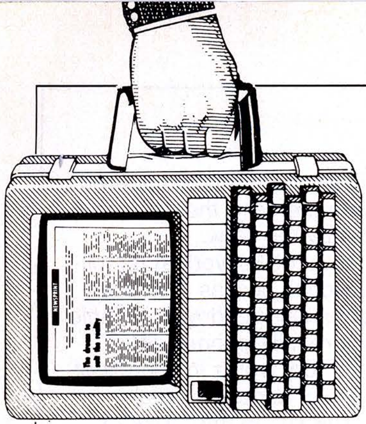
PRODUCTIVITY

BENCHTESTS



IBM PC text style checkers come under the spotlight. See page 97 for Jonathan Green's verdict


$3636
WHAT YOU GET:
• 6/8 MHz 80286 O Wait State
• 1 Mb AT
• Small Footprint
• 20 Mb Hard Disc
• 1.2 Mb Floppy Drive
• 200 Watt Power Supply
• Easy Word Processing Software
• Monochrome screen/graphics
• Phoenix B10S
• 12 months warranty
• MS/DOS
Telecomputing PCS
Telecomputing PCS Pty Ltd
Sydney 02 439 5966
Melbourne 03 696 2300
EGA PAINT
Lets you capture AUTOCAD screens & enhance the finished illustration!



Careless whispers in and around the Atari camp suggest that the company's next generation of micros will be based on the Inmos Transputer chip. Guy Kewney and associates reveal all this, and much more.

Transputer for Atari?

The next generation of Atari machines, I'm now convinced, will not be based on bigger and better Motorola 68000 chips, but on the revolutionary Inmos Transputer Chip.

Several things conspire to suggest this.

First, a mole inside the company's Sunnyvale headquarters warned me to look for signs of these developments. I found them when I visited the company in March.

Second, when challenged for an official response to the evidence I discovered, senior executives in the US make the tactical blunder, if they wanted to keep it secret, of saying it was a secret and they couldn't talk about it.

That makes it sound much closer than my mole had suggested.

I checked with another mole; and it turns out that Atari seriously hopes to have a working product on the market, at under $5000, some time next year.

The Transputer in question would be the new floating-point one, the T800 — of which I wrote recently that it could outperform the 68020 plus floating-point unit by a factor of nearly four.

The problem that Atari has not yet tackled, however, is that of operating software.

An operating system for the Transputer is something for more serious discussion than there is space for here. For the moment, however, I

This is proof that what you see above (IBM's new PS/2 Model 30) is now being assembled in Australia. The Wangaratta plant will eventually produce the Model's 50, and 80 as well, with its staff of 100. PCs produced here, however, do not necessarily end up in Australian stores but may be shipped to New Zealand, China, South Korea.

can say that Tim King, the man who wrote AmigaDos for Commodore, is rapidly gathering support for a project to produce a standard, multi-tasking, parallel operating environment for Transputer users.

And he has certainly been seeing people at Atari.

Tim King has a Transputer project of his own waiting in the wings, in the form of the Perihelion project being planned by computer industry pioneer Jack Lang.

His theory — and you can't really argue with it — is that the time is now, if we want to get a standard operating system for the chip. Leave it another year, and there will be a lot of half-baked things done by individual companies, all doing half the job and all incompatible.

His problem: money.

Perihelion plans to produce a $3000 Transputer-based workstation to rival the Sun workstation — an enormous machine running Unix. The Sun machines have just had a price cut of over 30 per cent, but even so, Perihelion (if it can be financed) would be able to come in well underneath.

Money for King's project would come from Atari, which has well over $US150m of spare cash, having just raised $US75m on the American stock market. That is, it would if King wasn't also under contract to Commodore to maintain AmigaDos. Atari doesn't trust Commodore.

Watch this space, because Atari's plans are currently fluid enough that each month changes them somewhat. But the project is very much under way, and as soon as Inmos is shipping T800s at reasonable prices, the company will look to have prototypes at exhibitions.

That could be as soon as March next year.

Guy Kewney

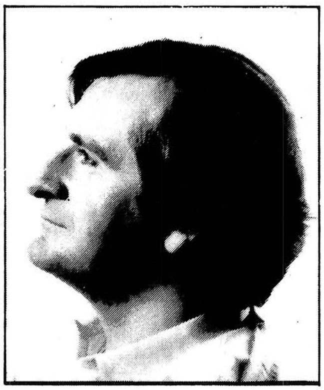
Bass on Viatel

Visitors to Expo '88 are now

able to book season passes through Viatel, Telecom's national Videotex system. The ability to book 3-day, 1-day and evening passes will be added to the service as they become available.

Eventually, Bass may offer acces to a wide variety of events through this system, but initially chose Expo '88 due to its national appeal.

From strange truth comes strange fiction



Douglas Adams in profile

The publicity for the new Douglas Adams game, Bureaucracy (from Infocom) is getting hauntingly like the game itself.

The game is based on (legend has it) a true episode in the life of Adams, author of the *Hitch-Hiker's Guide to the Galaxy*. He moved house, and his credit card was accordingly cancelled by the bank . . . or so it says on the publicity handout.

The true story is that he obtained a mortgage from the bank, which then sent its next two statements to his old address. He wrote, pointing out that the bank, of all people, should know the address of the property it had mortgaged. The bank wrote back, humbly apologising — and guess which address they sent the letter to?

The object of the game is to get the bank to acknowledge a change of address form.

I saw copies in March in New York, and was irritated to receive a press release from Activision — on 15 April — saying that it would be out in March. 'Why do we not get a review copy with the release? Why the delay?'

Answer: 'There is no delay.'

'But I saw it in New York last month.'

'Well, it's not ready yet — we're just going into manufacturing. It will be ready, let me see (rustle, rustle) . . . um, today!'

'Can I have a copy?'

'We hope to have it out on the street on Friday.'

'Friday, then?'

'Ah, but that's a holiday.'

'So there *will* be some delay.'

'No, no, but we do tend to slip a little.'

The really interesting point about Bureaucracy is that Douglas Adams didn't write it.

Infocom, in best bureaucratic traditions, appointed a team of 20-odd writers to work with him. By the time the team was assembled, however, Adams had spent too many weeks in Boston and was back in Europe.

The team thereupon messed up his ideas so badly that they ended up having to hire Michael Bywater, computer expert at *Punch*, to redo the whole thing.

I rang Adams to get his opinion, but naturally his phone was engaged. However, he had warned me (a year ago) that there was a starring role in the game for an automatic garage door which only opens when Flight 124 from San Francisco flies over, and behind which is a letter for you.

I asked Bywater how you solved the problem.

'I'm sorry. It's out. It had to go,' he said.

This promises to be a difficult adventure . . .

Guy Kewney

The disk is dead — long live silicon

Some people could interpret enthusiastic reviews of the Tandon PAC as an indication that disks are here to stay.

Wrong. The disk is dead, and the only question is: when do we bury it?

Disks in the next decade will be made of silicon. For once, I don't have to offer my own unsupported rantings as evidence of this. I can quote the *California Technology Stock Letter*.

'The key to understanding the future cross-over between the costs of semiconductor memory and disk memory is this: dynamic RAM chips always come down to $2 per chip.'

The most advanced purveyor of silicon, you will possibly be surprised to hear, is IBM. IBM has already announced that it is building memory chips with four million bits per chip. And it has started testing designs for a 16-million bit chip.

'Unless the strengthening yen messes up the relationship,' continues the analyst, 'the megabit DRAM should cost $2 some time in 1989.'

That will make chip memory cost under $20 per megabyte. Disks are around that level now, and will get cheaper. But the race is on, and the *Stock Letter* analyst has produced figures which seem to indicate the memory chip will win.

A chart reproduced in the *Stockletter* shows costs expected for bigger 14 inch disks and 8 inch disks, but not for the cheaper 3.5inch disks that are now about. Even so, silicon and disks meet at roughly the same cost per megabyte, in around 1994 or 1995.

At that point, why would you use disks? The only possible reason is that they don't need to be kept supplied with power to retain data.

They rattle. They whine. They crash. And compared with memory, they are *unbelievably slow.*

Most disks work at 80 millisecond access time. Fast ones can get down to single figure milliseconds. Most memory works in speeds of tens of nanoseconds.

The key to the future of the RAM chip is its power consumption.

When IBM is producing RAM chips holding 16Mbits each, eight of them will give 16Mbytes. 100Mbytes of storage will require 48 chips, which will draw too much power to be happy for more than a day or so connected to a set of Sony Walkman batteries.

But when IBM gets down to the 64Mbit chip, a couple of years later, we are talking about keeping 16 chips supplied with current. Really, not a problem. And IBM researchers are currently working on the 256Mbit chip. Sixteen of those would give half a gigabyte.

The disk is dead.

Guy Kewney

Speed is the essence

A 16-bit version of the Zilog Z80 is not, whatever Zilog says, 'the most talked-about product of the decade'. But it could be the product which keeps CP/M alive into the 1990s.

The chip comes in two main versions, both of which will run 8-bit Z80 code; but neither actually fits into the same socket as the old 8-bit Z80. So, designers who want to pay today's $US27 price per chip will have to design new boards.

The list of buzz-words produced by the company's publicists is strangely reminiscent of those in IBM's latest PS/2 announcements.

'The new Z280 provides system designers with three performance features required for highest throughput — on-chip cache, on-chip memory management, and support for burst

Twelve months old and growing fast

Offering a unique nationwide buying service, Computer Dimensions was set up to provide real benefits, in profitability and access, to Consultants, Smaller Dealers and Software Houses.

Our clients appreciate one-stop, one off buying. We can source almost anything you want, even if it is not available in Australia.

If you see something you need in an American computer journal there is every chance we can deliver it to you in two or three weeks. It may not be officially on the market in Australia for months.

We don't rip you off. We work on low margins ourselves.

In fact our belief is that it costs you money not to buy from us.

Ring and have a talk with Jeni or Kurt.

Sourcing **Contracts USA** **Advisory & Buying Service**
Ease of Access **Low Margins** **Small Quantities**

**3rd Floor, 63 Stead Street, South Melbourne, 3205.
Victoria. Telephone (03) 699 6122**

COMPUTER DIMENSIONS

CD3092

Higher resolution means sharper characters. More brilliant colors. And more information on the screen.

If you count the pixels, you should come up with 640 by 480. And 752 by 410.

How to choose an EGA card.

With so many Enhanced Graphics Adapters on the market, it's sometimes difficult to determine which one is best for your needs.

May we suggest a few guidelines to help you decide.

First and foremost, look for high resolution. At least 37% higher than "standard" EGA.

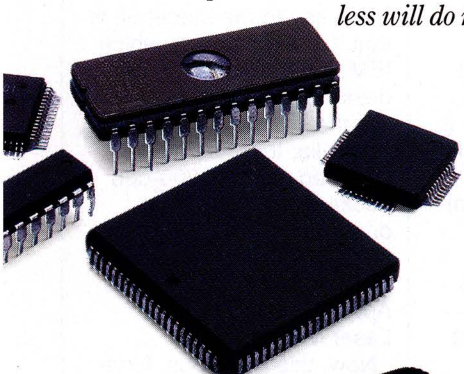
Like the resolution you get with the new VEGA Deluxe™ card.

(Of course, you can't see more than your monitor will display. So for more than 640 pixels by 350, the VEGA Deluxe requires a MultiSync® or equivalent.)

Next, look for 100% compatibility with every other video standard: EGA, CGA,

High resolution modes require TTL color monitors capable of 25 KHz and 29.4 KHz. Trademarks: VEGA Deluxe—Video Seven Inc.; Hercules—Hercules Computer Technology; MultiSync—NEC Home Electronics (USA) Inc.; EASYCAD—Evolution Computing; EGA Paint—Rix SoftWorks Inc.; GEM—Digital Research Corp.; Dr. Halo—Media Cybernetics; In·A·Vision, Windows Draw, Windows Graph—Micrografx Inc. Registered trademarks: Video Seven—Video Seven Inc.; Lotus 1-2-3, Symphony—Lotus Development Corp.; Microsoft—Microsoft Corp. Video Seven reserves the right to change specifications without notice.

The less chips on the board the better. 28% less will do nicely.



If you're a software developer, you can put in new code for your applications in just a couple of hours.

Two-year warranties are better than one-year warranties.

Does the card work with your current software? It should.

Hercules and MDA. As well as an autoselect capability when used with compatible monitors. Just like you get with the VEGA Deluxe.

Naturally, the card should include high-resolution drivers for Microsoft Windows, Lotus (with 132 columns and 43 lines), for 1-2-3 and Symphony. And software support from packages like AutoCAD, Windows, GEM, Dr. Halo, EASYCAD, EGA Paint, In•A•Vision, Windows Draw and Windows Graph.

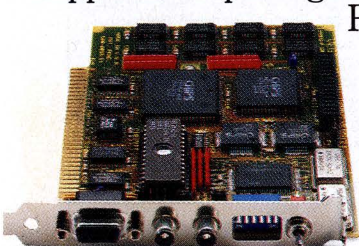
And finally, make sure the board is built with highly reliable surface-mount technology. And a unique, Video Seven proprietary CMOS EGA Integrator™ Chip.

Like the VEGA Deluxe.

Of course, you could probably save yourself a lot of trouble if you just went ahead and got the VEGA Deluxe EGA card.

Because that's very easy to do, too. In fact, we've already shipped over 200,000 EGA boards. So all you have to do is contact your local distributor listed below.

The VEGA Deluxe. It makes choosing easy.



Make sure you choose a short card. Like the VEGA Deluxe.

VIDEO SEVEN

Tech Pacific Pty Ltd: 119 Ferrars Street, South Melbourne, Vic 3205. Tel: (03) 690 9055, Fax: (03) 690 8283 • Sydney, Tel: (02) 319 2622
Wellington (NZ), Tel: (4) 736820

Dimension Graphics Pty Ltd: 201 Miller Street, North Sydney, NSW 2060. Tel: (02) 929 5855, Tlx: AA25693 • Melbourne, Tel: (03) 51 3353

memory.' Burst memory means that you don't have to do direct-memory transfers one byte at a time, but can take over the system bus and send a whole block (of finite size) at a time. It speeds up a system by several factors.

On-chip cache is fast because memory speed is the single greatest limiting factor in processor speed. Cache is fast because it stores things in the order which you are most likely to want them, based on how recently you last used them. (Strangely, when I organise my desk like this, it is described as 'a mess' . . .)

Other claims are : 'Any program written for the Z80 will operate without modification on the Z280.' Well, only if you do input and output the way Zilog said you should: this chip includes a UART — universal asynchronous receiver/transmitter. Software which talks to other peripheral chips will require rewriting. These days, a lot of Z80 software talks to special-purpose logic arrays. But the task will be relatively simple.

By this time next year, systems using this chip will run at least twice as fast as today's Z80 systems — the Amstrad range of 8-bit machines could all, theoretically, be upgraded like this. Software written to use the go-faster features could go much quicker still.

Guy Kewney

Banking on the Model 30

Inevitably, there was someone stupid enough to announce, on the same day that IBM announced its new System 2 machines, that it was going to spend $8m buying them.

Some people will do anything for publicity, and in this case, it's a bank.

Rule One of personal computing ('never be a guinea pig') having thus been broken, the situation was ripe for the announcement that the machine the bank was buying was not really a PS/2, but the strange Model 30.

With the new OS/2 operating system, you will never be able to run multiple copies of today's PC-DOS programs simultaneously — but then that's not different from today. And already, there are products on PS/2 range machines which can cope with this — Concurrent 386 and Desqview are two. They really can run Lotus Symphony, Crosstalk and Space Invaders on the same screen.

But the Model 30 won't run OS/2 because it isn't a 'protected mode' machine. and it isn't even a PC clone: software developers, even those quoted publicly as supporting the launch, have been very negative about this machine's compatibility problems.

The key to the Model 30 is that it is the machine which IBM has picked to run its desktop publishing system.

In the US, but not in Australia, IBM has announced an $US9000-odd package including laser printer, plug-in 68000 card, Pagemaker and Microsoft Windows, as its rival to the Apple Macintosh and LaserWriter.

Now, this is curious. Firstly, Windows on the real PS/2 machines, which is based on the 80286 and 80386 chips will be a different Windows. It will be Windows 2, or the 'presentation manager' of OS/2, whenever that arrives. And it will be quite fast.

Windows (today's version) is quite possibly all that Microsoft claims for it, but it is also slow. No-one who has seen it running on an ordinary 8086 machine has said they would like to work with such a system. IBM obviously would want to have

its desktop system available on a faster machine. Why not announce it on a Model 50?

My answer: because Windows (OS/2 version) will be quite different from today's version, and IBM doesn't want to support today's version *and* the new version on PS/2.

Guy Kewney

Courting disaster

The legal dispute in the US (reported last month) over two communications programs — Crosstalk XVI and Mirror, a 'lookalike' — has just ended in a tantalising half-victory for each side.

Lotus, however, the publisher of Lotus 1-2-3, doesn't see it like that.

If you or I were Lotus, sueing people whom we felt had copied the 'look and feel' of our program, we would be very disappointed to hear that a judge had said, very specifically, that 'look and feel' was not a suitable subject for copyright.

The judge in the Mirror vs Crosstalk case said last month in Atlanta that Crosstalk had copyright on 'the arrangement and design of the status screen' — the two are shown together here — used by Mirror.

But Crosstalk did not have a case against Softklone for Mirror itself, because, said the judge, he was not granting Crosstalk copyright 'over the ideas of a command-driven program, or the user of particular command terms or symbols.'

So I expected to find a disappointed Lotus when I contacted the company.

Not at all, they said. Well, *eventually* they said not at all. I was referred to a US publicity chief. He promised to call back. Meanwhile, Lindsey Kiang, general counsel (head of legal staff) who had been delighted to speak to me six months ago when Broderbund won a look-and-feel action against Unison, suddenly was unavailable for comment.

I was finally granted an interview with an official who pronounced himself entitled to speak on Lotus' behalf, who referred me to the company's lawyers in New York. 'I understand that he has been advising journalists privately, but I don't know what he's been saying,' I was assured.

Now, the two cases seem to me to be very similar. VP Planner, published by my old friend Adam Osborne, takes the idea of a spreadsheet and improves on it by adding more database. Mirror takes the idea of a comms program and improves on it by letting it run in background mode. Both are 'keystroke compatible' with the originals, in the same way that many programs are 'keystroke compatible' with WordStar.

I wondered whether Lotus was disappointed with the outcome? It appears not.

'As I see it, there are two scenarios possible, and either way we win.'

He then explained, and I quickly got lost. It seems he argued like this: since Paperback Software's VP Planner doesn't actually use the same design and arrangement of the status screen, and since Lotus has been refused copyright on the same screen, Lotus would be bound to win . . .

What! Why? Because the judge would tell the copyright office to provide copyright on it, or else would say that copyright on the program covered the screen anyway.

'But VP Planner doesn't use the status screen,' I said. 'Well, then we come to the commands of the program.'

'But the judge said that those weren't copyright.'

'Well, then, we still have to come down to the question of the actual code.'

There has never been any suggestion that the author of VP Planner copied a single byte of Lotus 1-2-3 code. If the suggestion were made, it would be a joke, because VP Planner resembles Lotus about as much as Mirror resembles Crosstalk. It has a three-dimensional database built into it, something more on the lines of dBaseII with an extra dimension. It does some things faster than 1-2-3, others slower, and has one or two minor bugs of its own while omitting one or two minor bugs of Lotus 1-2-3.

```
           ┌──── CROSSTALK - XVI Status Screen ───┐        Off line

NAme    Personal Computer                          LOaded   C:STD.XTK
NUmber  439-4242                                   CApture  Off

┌───── Communications parameters ─────┐           ┌── Filter settings ──┐
 SPeed 1200   PArity None   DUplex  Full          DEbug    Off  LFauto    Off
 DAta  8      STop   1      EMulate None          TAbex    Off  BLankex   Off
 POrt  1                    MOde    Call          INfilter On   OUtfiltr  On

┌──────── Key settings ───────────────┐           ┌── SEnd control settings ─┐
 ATten  Esc                 COmmand ETX (^C)      CWait    None
 SWitch Home                BReak   End           LWait    None

┌──────────────────── Available command files ─────────────────────────┐

 1) BIX        2) BIXDIREC    3) CSERV      4) GOLD       5) GOLDIREC
 6) GOLDPSS    7) MUDIREC     8) MUDXT      9) NEWUSER   10) OFFICE
11) SETUP     12) SOURCE     13) STCDIREC  14) STD       15) VNU


Command?
```

```
           ┌───── MIRROR Status Screen ────┐          Off-line

NAme    Personal Computer                          LOaded   None
NUmber    439 4242                                 CApture  Off

┌───── Communications parameters ─────┐           ┌── Filter settings ──┐
SPeed  1200  PArity None    DUplex  Full          DEbug    Off  LFauto    Off
DAta   8     STop   1       EMulate None          TAbex    Off  BLankex   Off
POrt   1                    MOde    Call          INfilter On   OUtfiltr  On

┌──────── Key settings ───────────────┐           ┌── SEnd control settings ─┐
ATten  Esc                  COmmand ETX (^C)      CWait    None
SWitch Home                 BReak   End           LWait    None

┌──────────────────── Available command files ─────────────────────────┐

 1) BIX        2) CSERV      3) GOLDIREC   4) PCD4       5) SETUP
 6) VID_MONO


Command?
```

I put this point to the official. 'Well, we still haven't examined the code. That comes later.' Later? It's already two years since VP Planner was launched!

And he proceeded to read me a sermon. It had to do with the need to protect innovation, and the need for legal acknowledgement of the intellectual property rights.

Innovation? What innovation are we getting out of Lotus? What has it done since inventing 1-2-3?

VP Planner is an innovation. I'd say Lotus is trying to suppress it.

I tested this theory. I asked Adam Osborne: 'If, when you were launching VP Planner, Lotus had arrived and said: "Hm, that's a nice program. Very like ours though, isn't it? How about paying us a royalty of $50 per copy?" — what would you have said?'

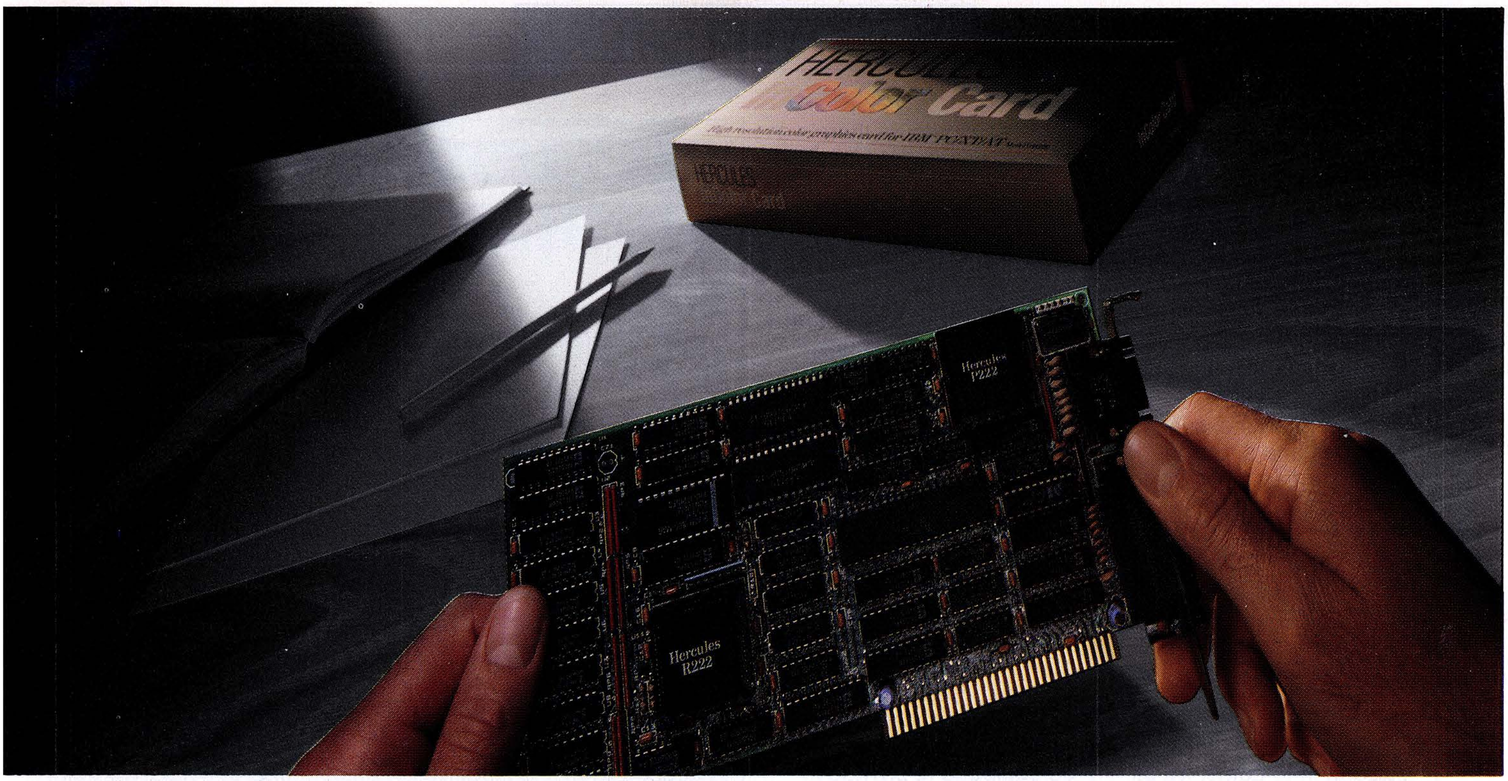
'I'd have jumped at it,' he said. 'No question. I'd have been wrong, legally, but it would have avoided so much hassle.'

And the precedent would have been set.

It didn't even occur to Lotus people to try. The reason, whatever they say today, is simple: they weren't interested in licensing their idea, but in suppressing competition. They wanted to charge exorbitant rates for 1-2-3, and competition threatens to force those prices down.

Now, I'm all in favour of copyright and patent protection (what writer wouldn't be?). It works well in the micro business. And the law should be clear, and it isn't.

In the semiconductor business, Fairchild invented the integrated circuit and lived for years off the patents. Intel and Texas Instruments invented the micro and the single-chip micro, and paid each other and Fairchild.



Introducing the Hercules InColor Card.

It runs more software at a higher resolution than any other colour graphics card.

The Hercules® InColor™ Card offers everything you'd expect from a high resolution colour graphics card from Hercules – and more.

Compatibility: The InColor Card is compatible with the thousands of programs that run on our monochrome cards.

Colour: The InColor Card gives colour capability to Hercules-compatible software like 1-2-3® and AutoCAD®.

Resolution: The InColor Card's resolution of 720x348 is the highest of any widely supported standard.

RamFont: The InColor Card has our unique RamFont mode – in colour.

Better graphics

Hercules is known for bringing high resolution monochrome text and graphics to programs like 1-2-3® and AutoCAD®. Now the InColor Card gives you the same high resolution 720x348 graphics in up to 16 colours using an IBM® Enhanced Colour Display, multisync monitor, or equivalent. That's the highest resolution of any widely supported graphics standard.

And no other colour graphics card allows you to move back and forth between colour and monochrome systems *without changing drivers.*

Runs more software.

All Hercules-compatible text, graphics and RamFont software runs on the InColor Card in black and white, or at least two colours.

And many popular programs like 1-2-3®, Symphony,® AutoCAD® and Microsoft® Windows that use graphics or RamFont, run in full colour.

More powerful RamFont.

RamFont is a new mode developed by Hercules that gives your software the ability to display multiple fonts at lightning fast speeds.

RamFont transforms advanced word processors like Microsoft Word from slow to text-mode fast. Technical word processors like Lotus Manuscript™ use RamFont to display onscreen the text you want to print. Even 1-2-3 uses RamFont to almost double the size of the spreadsheet picture.

And now, with the InColor Card, you get an enhanced RamFont with 3,072 programmable characters in up to 16 colours. All the way up to 12,288 characters in four colours. With the InColor Card's RamFont, no program should run out of speed, colour or fonts ever again.

What the InColor Card could mean to your company.

The InColor Card allows you to run a program in colour, and then move to a Hercules Graphics Card Plus and run the same program in monochrome. Without changing drivers.

Compatibility between the InColor Card and our monochrome card allows you to network around one standard – Hercules.

At last your PCs will have compatible graphics, in colour or monochrome.

Remember, only the InColor Card has colour-to-monochrome compatibility, high resolution text and graphics, and the power of colour RamFont.

$950 ex. Tax
Suggested Retail Price

Hercules.

The New Hercules InColor Card.

TECH RENTALS,
55, BLAXLAND RD,
RYDE. 2112 NEW SOUTH WALES
SYDNEY: 02 8083055
MELBOURNE: 03 8792266

TECH PACIFIC
119 FERRARS STREET
SOUTH MELBOURNE
VICTORIA 3205
MELBOURNE (03) 690 9055
SYDNEY (02) 319 2622

Hercules Computer Technology, 2550 Ninth Street, Berkeley, CA 94710. Ph: 415 540-6000. Telex: 754063. Fax: 415 540-6621. Trademarks/Owner: Hercules, In Color, RamFont/Hercules; Lotus, 1-2-3, Symphony, Manuscript/Lotus; Microsoft/Microsoft; AutoCAD AutoDesk; IBM/IBM.

But no-one ever suggested that, as the inventor of the integrated circuit, Fairchild was entitled to obtain injunctions against anyone who wanted to use the technology.

The Lotus Corporation seems to see it like that. It is remarkable. It daily gets more and more like Telecom, with an excuse for everything and a total inability to understand why the rest of us get irritated with it.

The question has to be asked: what is it all *for*? We can see this monstrous elephant of a company crashing around, trampling on fences, destroying saplings and making loud trumpetings, but what's in it for the rest of us?

According to Lotus, it's all to provide the resources for research and development of new products. Such as?

Take Manuscript, the latest gem from the company. It's a very fancy word processor, and on specification alone, it looked like the answer to a prayer — handling fonts, columns, graphics, foreign script, outlines, and so on.

But the reality is such a disappointment! My colleague Robert Schifreen described it as 'something written by a committee,' and that sums it up. It's greedy for memory, ruling out RAM-resident programs. It's clumsy onscreen, either using blocks (why?) or hopelessly slow.

Its help screen has 36 different subject headings, and to select one, you have to hold the cursor down and scroll through because it can't work out that if you type 'V' you must mean 'Virtual Memory' — something basic to Lotus 1-2-3 technology.

It doesn't understand what a mouse is — in 1987, for goodness' sake! There isn't even reference to 'mouse' in the index.

There are menus, some of which require you to hit 'Enter' and others which require you to type 'Ins', the insert key. No doubt there's a reason, but it beats me, and I always get it wrong. I can't delete a line, and I can't even set up a macro command to let me do so.

It costs a fortune, but it comes with the manual unbound; you have to insert separators and load the thing into three ring binders. (We'll have a new edition out in due course, Guy.')

The design concept is excellent. And if Manuscript had been released by a one-man band in a hurry, for $200, you'd expect something like this. For the price Lotus is asking — $1050 — however, you expect a finished product — polished, slick, and with bells and whistles. And Lotus should be equipped to provide it.

But all the 'innovation' I can see from Lotus has come from companies it has bought up. Otherwise, it is starting to look like bureaucracy gone mad, including Manuscript.

Lotus should examine its soul hard, and ask exactly where it is trying to go.

At the moment, the company is trying to create a software world where the equivalent of *West Side Story* would be impossible for Leonard Bernstein to write because it has the 'look' and 'feel' of Shakespeare's *Romeo and Juliet.* The music, the creativity and the artistry — all would count for nothing.

Is this what Lotus wants for our micro world?

Guy Kewney

Mirror: the changes

After the lawsuit, Mirror had to be withdrawn. Mirror II was promised for a week later, with a new 'status screen' and several important upgrades.

Unfortunately, I still can't use it as my only comms program, despite improvements to the Kermit file transfer, because the silly people still haven't implemented sliding-window Kermit.

WEST COAST FAIRE REPORT
SAN FRANCISCO, 26-29 MARCH

Tales from the Faire

A week before IBM dropped its bombs, the West Coast Faire was held in San Francisco. All the hype in the world couldn't rescue the world's oldest computer show from this blunder — no-one did anything.

The Faire is an old favourite with micro freaks — and last year, it looked like it was on its way back.

It used to be the place for Silicon Valley types to meet, have parties, discuss ideas, do deals, and chat up the Press.

Last year was the first time it was organised by Interface, after several years in which some misguided souls tried to make it a business show with no games, no start-up whizzkids and no loonies. This year, I really expected the revival to be under way.

I think next year I'll give it one last chance, just in case it was the IBM eclipse that spoiled this one.

But spoiled it was.

The most interesting whizz-kids were simple crooks — setting up booths which sold cheap clones at unrepeatable offers, or spurious software, or junk, all to disappear at the end of the show and vanish into the mist when customers started wondering why it wasn't working.

That said, I did come back with one or two goodies, as follows.

AI on Lotus!

Lotus believes programmers should produce add-ons to 1-2-3, not rival spreadsheets. Lotus should *love* Robert Benson, who has used 1-2-3 as his programming language for an expert system.

Benson doesn't believe that his If/Then package is going to dominate artificial-intelligence markets, but he does think he will sell some, at $US70 a copy.

'There's been a lot of stuff written about expert system AI and rule-based and knowledge-based software,' he said from a tiny corner of a small booth he was sharing with other entrepreneurs.

'And corporate businessmen are wondering what it's all about — and this gives them a chance to find out.'

A toolkit of five templates 'de-mystifies' AI, by teaching such concepts as backwards chaining, forward chaining, knowledge representation, demons and fifteen other ideas.

'At the end of it, the typical Lotus user will have some idea of what kind of expert system might be helpful to deal with whatever problem they have,' said Benson.

I think it sounds really interesting, and if only I could get Lotus 1-2-3 version 2 properly installed, I'd even test it myself.

Details, for anyone with version 2, are available from If/Then Solutions, 1 Mallorca Way, Suite 301, San Francisco, Ca 94123. Tel: (415) 346 5886.

Turbo Pascal link

My favourite idea at the show was a programmers' utility to let Turbo Pascal writers link to assembly language. It was called

Continued . . .

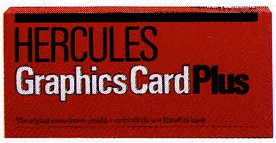
Why RamFont™ is so essential to your software.

Until now, most programs could only display 256 pre-programmed characters.

Just enough for the regular alphabet, some numbers and a few special symbols.

Enter the Hercules™ Graphics Card Plus.

Its extraordinary new RamFont mode can store up to 3072 *programmable* characters, and display them at lightning-fast speed.



And RamFont is so flexible, you can even mix graphics on the same screen as text.

A whole new generation of software is available now, taking advantage of RamFont's unique capabilities to give you more power and speed than ever before.

Lotus® 1-2-3®.

By using RamFont to display smaller-than-standard characters, 1-2-3 Release 2 gives you a spread-sheet that shows almost twice as much data as before.

And, RamFont makes scrolling instantaneous and smooth, rather than painfully slow and jerky.

You can even view a graph in a pop-up window – another RamFont first.

Microsoft® Word 3.

Word 3 was the first PC word processor that let you see boldface, italics, subscripts and superscripts mixed with regular text.

But it was slow

Not anymore.

With RamFont, Word 3 runs almost four times faster.

Lotus Manuscript.™

Manuscript is Lotus' new technical word processor, written to run optimally on the Hercules Graphics Card Plus.

It uses the RamFont mode for fast, multiple-font text editing.

Then it switches to graphics mode to format a page for printing, showing proportionally spaced equations.

Even more goodies.

Besides these dramatic improvements, RamFont also dramatically improves the scrolling speeds of Symphony® 1.1 and Framework II.™

For WordStar,® there's a RamFont add-on that lets you use multiple fonts.

There's even a new word processor that lets you write in Greek, Russian and Hebrew, *on the same screen.*

And there's more incredible RamFont software right around the corner.

And now, the *really* good part.

RamFont is only one of the Hercules Graphics Card Plus, major advantages.

You also get our famous high resolution graphics, to run programs like AutoCAD® and Pagemaker.™

And our high-resolution text mode that runs thousands more programs.

Here are a few of the programs taking advantage of RamFont.

Lotus 1-2-3 Release 2
(and later)
Lotus Symphony Version 1.1
Lotus manuscript
Microsoft Word 3.1
(includes mouse support)
Ashton-Tate Framework II
Nota Bene™
PS™
Computer Linguist

For a complete list, contact the distributors shown below.

And a parallel printer port that can be "unplugged" for geater flexibility.

All for the astonishingly low suggested list price of $595 ex. tax.

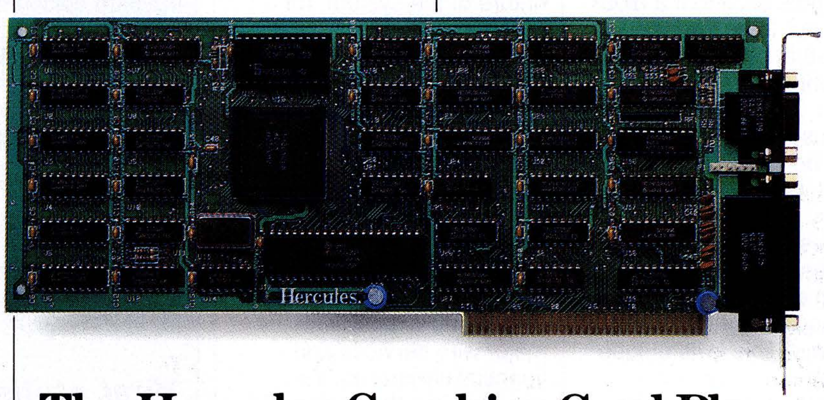
$595 ex. tax.
Suggested Retail Price.

Which, on top of the Plus' performance, has caused a few people in the industry to get unusually excited:

"If you intend to buy an IBM PC or clone and want to run a monochrome system, this is the card to get. I wouldn't even think of anything else."

John C. Dvorak,
PC Magazine *columnist.*

Neither would we.



The Hercules Graphics Card Plus with RamFont.

TECH PACIFIC
119 FERRARS STREET
SOUTH MELBOURNE
VICTORIA 3205
MELBOURNE (03) 690 9055
SYDNEY (02) 319 2622

Address: Hercules, 2550 Ninth Street, Berkeley, CA 94710. Ph: 415 540-6000. Telex: 754063. **Trademarks/Owners:** Hercules, RamFont/Hercules; Lotus, 1-2-3, Manuscript, Symphony/Lotus; Microsoft/Microsoft; Framework/Ashton-Tate; WordStar/MicroPro; AutoCAD/AutoCAD; Pagemaker/Aldus; Note Bene/Dragonfly; PS/Scroll Systems.

A sliding window is not an onscreen animation. It refers to the fact that Kermit, like Xmodem, does error-checking in blocks. The problem arises when you transmit a file down phone lines from one machine to another.

At the end of each block of a couple of hundred bytes (it's variable) the receiving machine sends an acknowledgement to the transmitter. It does this by sending a checksum, which should match that of the transmitting micro. If not, the block is re-transmitted.

On a comms link to the US, there is a significant delay between the time the block ends and the time when the next block starts, because the machines have to wait for acknowledgement.

Procomm, a 'shareware' program supplied by DataStorm Technologies in the US, can take half an hour to download a file that takes Mirror two hours to receive, because it doesn't wait for the acknowledgement.

Sliding-window technology save the blocks in memory, and doesn't have to wait for the clerical process of acknowledgement of blocks. When the response does come, several seconds later, it only gets excited if a block turned out to be bad, and requests that block — which was sent several seconds ago.

This uses memory, and Mirror, being RAM-resident, doesn't want to waste memory. Mirror has to be RAM-resident because it operates in the background, running constantly, even while you use other programs. This is its unique strength.

It would be so nice to be able to let Mirror get on with downloading the program, or an article, or whatever file it might be, while I carried on with typing, sorting disks, or spreading sheets — but not at the price of spending two hours online to a remote system instead of 30 minutes.

So, I use Procomm.

One day, both Mirror and Procomm will do Viatel, too, but today they don't.

So I need a third comms program to do that.

It's a mess, isn't it?

Guy Kewney

The sky's the limit for videotext

When videotext systems were developed in the late 1970s, it was assumed that they would eventually be the hottest thing for the home and business market. In Australia, these facilities have been implemented on viewdata services like Viatel and off-air teletext services like that from Channel 7. In the US major companies like IBM, Sears, Knight-Ridder, and so on, jumped on this bandwagon and tried to get the market to accept this new technology; but to date it has been a real flop. IBM just recently backed out of the Sears/IBM videotext project, and Knight-Ridder has all but abandoned its service.

One of the reasons for videotext's slow start has been the lack of inexpensive ways to deliver such data and the high 'online' charges. Another area of concern has been keeping the interactive nature of the system, for which telephone lines are the best medium. But for a long time, it has been held that TV cable systems would be the most efficient way to actually deliver the data in the most cost-effective manner.

With a new system called PC Express, a computer user with a TV cable system can link up directly with the major wire services and financial databases. You can also use the system to get the latest weather, sports and business stories, as well as information on your favourite soap opera, a review of the hottest play on Broadway, or even a review of a book on the *New York Times* bestseller list.

You do not get the interactive features like Email, or

Continued from previous page

Turbo ASM and was priced at $US99.95.

It allows the loading of assembler in three ways: included .COM files; separately assembled .COM files loaded on the system heap (taking no Turbo code space); or as your own interrupt routines called from Pascal, also taking no code space.

As an add-on product, PM Tools supplies a library of routines that can be included. The company has promised to send this on to us, and we'll let you have a report if we like it, later this year.

In the meantime, details on (415) 366 2062.

New Modula-2

Doing his best not to look like the son of someone famous, Alex Pournelle showed his new version of Modula-2 for MS-DOS computers.

This is the 'large-memory version' of that programming language, and the company which produces it is called Workman and Associates.

The company launched the product as 'based on the third edition of Niklaus Wirth's book, *Programming in Modula-2*, where other compilers conform only to the second, older edition.'

The language is an enhancement of Pascal by the inventor of Pascal, and should gain in popularity.

The price of the new version is $US80. Details on (818) 791 7979.

Vital statistics

A magazine for artificial-intelligence users of micros has been launched.

After Adam Osborne's candid admission (in connection with his own VP Expert) that 'expert systems on micros are just database', you might think there wasn't much future in the mag — and you'd be hopelessly wrong, I think.

Interest in the subject at the Faire was enormous. The first edition of *PC AI* runs to 70 pages, and features a buyers' guide to AI products costing less than $US100 — a long list.

To encourage potential readers, the publisher listed some statistics. Selected from a page full of these:

Number of add-ons for Turbo Prolog — 2. Number of users — 100,000 plus. Estimated number of people employed in commercialisation of AI — 16,000. Number of people who attended Texas Instruments' first satellite AI symposium — 30,000.

And:

Number of people who jump out of an airplane daily — 5000.

The magazine, whimsey apart, sells for $US4.95 in the US, $US28 per year, plus $US25 airmail costs. Details from Knowledge Technology, 3310 West Bell Road, Suite 119, Phoenix, Arizona 85023. Tel: (602) 439 3253.

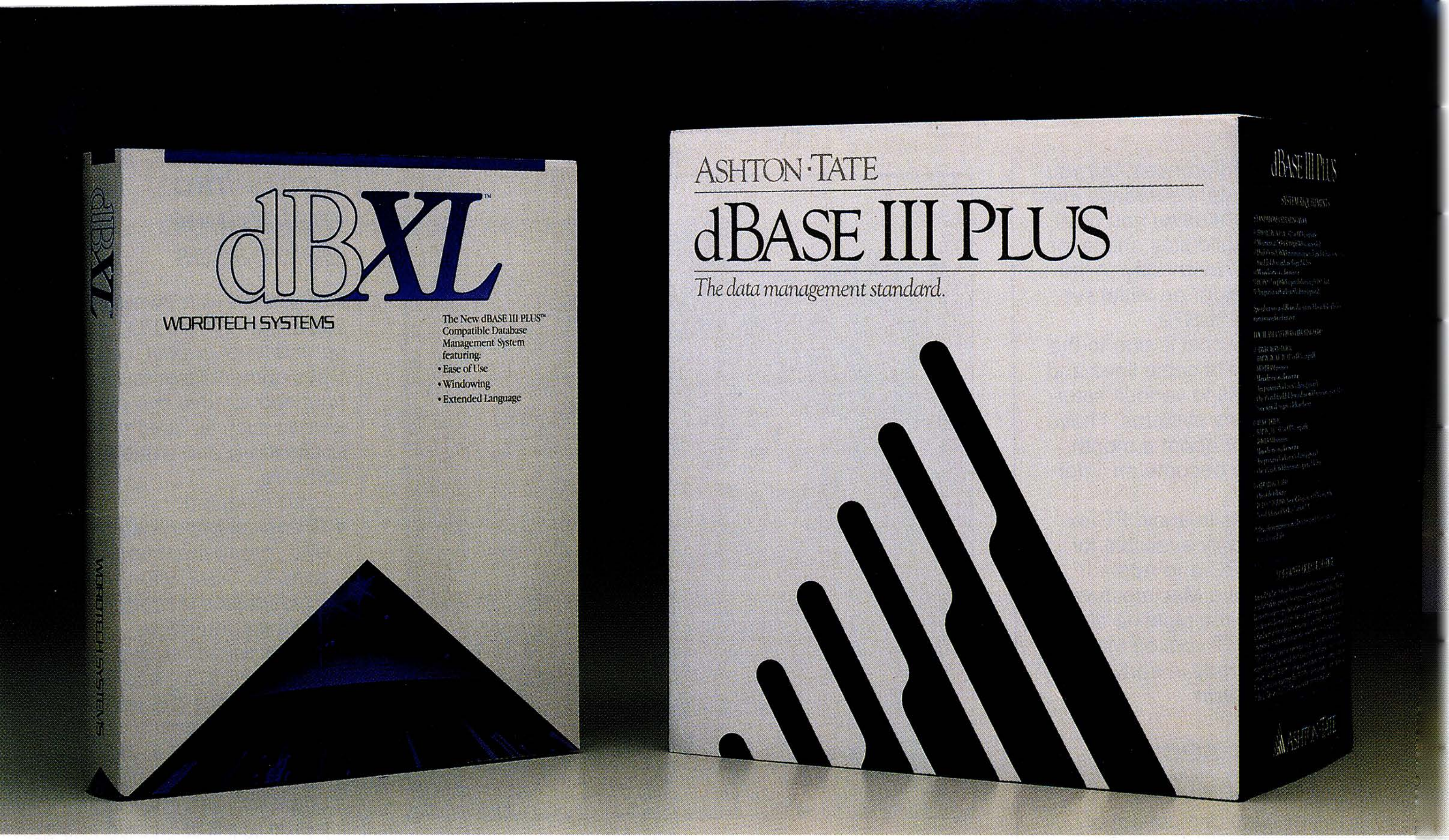
A new Magic Sac, legal or not

Apple insists it's illegal, but Data Pacific has now announced a new revision of its Magic Sac which, in conjunction with genuine Apple Macintosh ROMs, lets you run Macintosh software on an Atari ST.

The new version, revision 4.0, allows you to use 800k drives, and also allows you to use printers that aren't Apple Imagewriters — for example, Epson or Epson compatibles.

The Sac is a plug-in cartridge, from Data Pacific on (303) 733 8158. Address is 609 E Speer Blvd, Denver, Colorado 80203.

END



Depending on which package you buy it in, dBASE® power will cost you $450 or $1470.

Introducing dBXL.™
The dBASE III Plus™ "Superclone".
At just $450, it makes paying
for a name pretty pricey.

Just as you can buy two versions or more of programs like BASIC, you can now buy two versions of dBASE power. Depending on which version you buy, you'll get more or less the same performance for $450 or $1470.

Get a lot more for a lot less with dBXL.

With dBXL, both files and syntax are compatible with dBASE III Plus. You can interchange databases, indexes, and other files between the two products. And if you've used dBASE, you'll only need to learn the commands we've added (yes added) to make the dBASE III language more powerful. They run the same. But with dBXL you'll have more to run with. And you don't need to worry that we're stepping on anybody's toes, because our unique agreement with Ashton-Tate makes dBXL a safe alternative.

If you're new to dBASE, dBXL INTRO lets you run the program with menu choices. A "tutor" line simply shows you which dBASE III Plus command you're creating with the menu. If you goof, error messages are simple and easy-to-understand, and two levels of *Help* are just a function key away. Even our documentation is easier; it's better written, better organized, and more concise.

For you power users, we've included special features like access to DOS services, up to 99 windows without any other software, and automatic memory variable management. Whether you're programming for yourself or others, dBXL is the ultimate development tool.

Unlike dBASE III Plus, dBXL runs on PC-DOS or MS-DOS, so you can run it on the HP-150,™ the TI Professional,™ and the Apricot,™ to name a few.

dBXL. It's more power than the name brand without paying for the name.

INTRODUCING dBXL

WORDTECH SYSTEMS, INC.

ICT INTERNATIONAL • COMPUTING • TECHNOLOGIES

Level 49, The MLC Centre, 19-29 Martin Place, Sydney, NSW, 2000, Telephone: (02) 398-9333

online conferences, but you do get instant database information whenever you want it. You could stay online for 24 hours, every day of the month, all for an initial set-up fee of $US79.

The low cost is due to the utilisation of cable lines and direct links to various satellite delivery systems. I have used it for about a month, and have become an 'informaniac'.

Still in its infancy, PC express is only available for the IBM PC and Apple II world, but a Macintosh version is in the pipeline and an Atari ST version may well be ready in early 1988.

Tim Barjarin

IBM's secret Model 70

A missing component of IBM's new Personal System/2 line — a desktop computer based on the 80386 processor — is being developed to fill an obvious hole in the firm's PS/2 line, according to sources who have seen the machine.

Prototypes of the machine, called the Model 70, have been seen by only a handful of industry sources and a small number of corporate MIS executives who claim to have been told by senior IBM marketing managers and planners that the system will be introduced late this year.

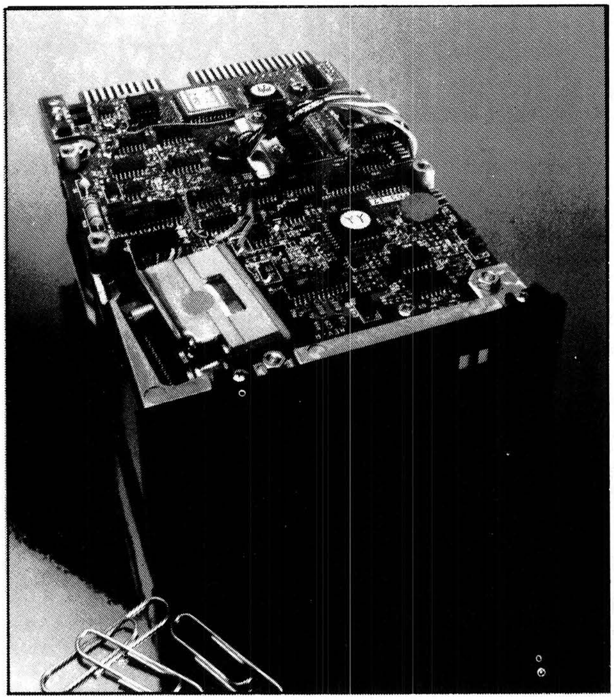
The Model 70 is said by sources to include a number of features not found on the Model 80.

Unlike IBM's floor-standing Model 80s, the Model 70 is a desktop '386. And, said sources close to IBM, the Model 70 will possess advanced graphics capabilities and will use a 20MHz microprocessor. These Model 70 features could extend the PS/2 family into academic, scientific and technical applications dominated by rival smaller firms.

Another key among the differences between the Model 80 and Model 70 prototype, said the sources, is custom logic on the motherboard that provides the same functionality as IBM's 8514/A PS/2 display adaptor option for the PS/2s.

This would give the Model 70 built-in resolution of 1,024 by 768 pixels while displaying up to 256 colours as opposed to the 640-by-480 pixel and 16-colour resolution of the Video Graphics Array (VGA) built into the Model 50, 60 and 80.

The higher resolution could be used in CAD/CAM (computer-aided design/computer-aided manufacturing), and high-end scientific and engineering modelling applications.



C Itoh kindly supplied this picture of a 3.5inch Winchester disk drive — one holding 45Mbytes. It's a new design, with an average access time of 45 milliseconds; and to get that, it spins at 60 revolutions per second. You may well find it, before long, in Apple Macintosh designs. The company provides it with the option of an imbedded SCSI controller.

HP goes for PostScript on its laser printers

Hewlett-Packard has announced support for Abode Systems' PostScript page-description language in its LaserJet printer line.

The announcement redefines HP's desktop publishing strategy, not only because it adds support for the industry-standard PostScript, but also because it means HP will now have third party manufacturers provide page-description language support for its printers.

Last November, Hewlett-Packard committed to supporting DDL, a competing page-description language from Imagen. Under its new plan, HP will support both PostScript and DDL through third parties, thereby giving the approximately 300,000 LaserJet users a choice of products.

The decision to support PostScript "is based on HP's realisation of the reality of PostScript — people want it," said Steve Simpson of Hewlett-Packard.

Lotus into mainframe databases

Not content with owning the lion's share of the PC spreadsheet market, Lotus Development last month announced a move into new arenas such as mainframe applications and database software.

Lotus revealed:

- Graphical-based database and spreadsheet applications for OS/2 with the Presentation Manager graphical interface;
- an enhanced release of 1-2-3 for DOS 3.x and OS/2;
- a version of 1-2-3 for IBM mainframes; and
- a facility to provide tight integration between new Lotus text and graphical-based applications for OS/2, the new PC operating system from IBM and Microsoft.

Lotus capped off these aggressive expansion plans with the announcement of a 10-year joint development and marketing agreement with IBM.

Under the contract, IBM will exclusively distribute the mainframe version of 1-2-3 as well as work with Lotus on a series of future PC products in the areas of databases and Structured Query Language (SQL), said Jim Manzi, Lotus president and chairman.

Mr Manzi characterised Lotus's product plans and future direction as providing customers with a choice of computing environments. "This is not a time of software revolution, but of systematic evolution," he said. "The software industry should never allow itself to fall prey to technological or intellectual hardening of the arteries . . . yet our industry's future will not resemble the kind of wide-open spaces that we saw five years ago when Lotus got off the ground."

Lotus has opted to pursue parallel paths in spreadsheet technology. It will

LAST YEAR, FOUR ITALIAN MODELS SEDUCED 550,000 PEOPLE.

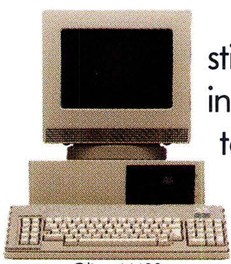
With their stylish good looks, it's easy to see why our models have been attracting so much attention.

But when you buy an Olivetti PC, you'll soon see there's a lot more to them than meets the eye.

You'll be getting hardware which will be able to handle new generation software, and which is totally industry compatible.

And technology which will allow your PC to expand right along with your business.

Which means it will still look as good to you in the future as it does today.



Olivetti M28.

Take the Olivetti M28.

This top of the range, AT level PC is based on the very latest 80286 architecture.

And is expandable up to 70 megabytes through both integrated and external mass storage devices.

Olivetti M24.

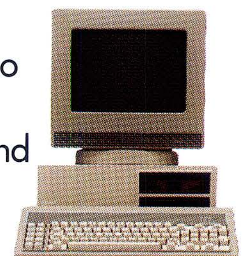
Another of our Italian beauties is the M24SP.

It's a real fast worker.

But it won't pull a swifty on your budget.

The M24 is already a world famous model, gaining last year's coveted PC World Magazine's "World Class Award".

And then there's our entry model, the M19.

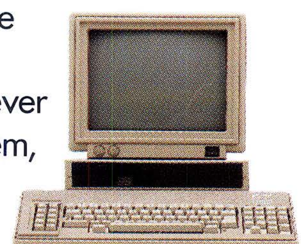


Olivetti M24SP.

With the ability to function as a network workstation, or as a stand alone desktop.

Of course, all of our Olivetti PCs are outstanding performers, with stylish good looks and high quality graphic resolution.

But that's just what you'd expect from Olivetti, the first manufacturer of desktop PCs in the world.



Olivetti M19.

So now, whichever way you look at them, the Olivetti range of PCs will always come up roses.

After all, more than half a million people can't be wrong.

olivetti

Grey/Oliv 0402

provide 1-2-3 release 3 with expanded features for the DOS world and OS/2. And it will create a new product, 1-2-3/G, a spreadsheet with a graphical interface, for OS/2 and the Presentation Manager.

Also announced is 1-2-3 release 3, which will run under DOS 3.X or in the protected mode of OS/2. It incorporates the familiar 1-2-3 text-based interface, but is a structurally different release of 1-2-3 rewritten in C language, said its developers.

The new release, slated to be shipped in early 1988, will feature improved graphics, the ability to consolidate spreadsheets and an expanded programming facility to build on 1-2-3's current macro capability.

1-2-3/G, a component of a family of tightly integrated applications for OS/2 and the Presentation Manager, will support dynamic links to the new database program, called Lotus/DBMS, and advanced financial-modelling and analytical tools such as goal-seeking. It will be released after IBM's Presentation Manager becomes available in 1988.

The mainframe release of 1-2-3, called 1-2-3/M, will look like 1-2-3 release 3, but will run on IBM mainframes under the VM or MVS operating systems. It is slated for shipment in early 1988.

Sources close to Lotus said the company is also planning a version of 1-2-3 for Digital Equipment's VAX computers, to be announced later this year.

The final product direction outlined by Lotus was its new Lotus Extended Applications Facility (LEAF), which is described by the company's executives as the 'glue' to bind together a system of Lotus applications — both text-based and graphical interfaces — as long as they run under a version of OS/2.

LEAF will allow Lotus applications to exchange live data among themselves, so a change in the database, for example, could be instantly reflected in the spreadsheet. LEAF will be built into the new Lotus applications and will be offered to developers and corporate customers as a separate tool kit.

Along with these announcements, Lotus said it will offer two new versions of Symphony. A version of Symphony compatible with 1-2-3 release 3 will be announced some time in 1988, and an intermediate release will be introduced later this year.

Compaq loyal to original PC

Claiming there has been no 'mass migration' to IBM's new Personal System/2 (PS/2), Compaq head Rod Canion said his firm plans to keep building to the 'industry standard' set by the original IBM PC.

At a press conference last month, Mr Canion said Compaq has no plans to duplicate IBM's new PS/2 line and will not unless customers demand it.

In his strongest attack yet on the new products, he predicted that both the PS/2s and the Operating System/2 (OS/2) would meet with only limited acceptance, at best.

The 'automatic mass migration' that took place in the past to new versions of DOS won't happen with OS/2, he said. "DOS 3 applications will continue to meet a far broader set of user needs than OS/2 will supply long after it becomes available."

Mr Canion repeated earlier comments that the improvements in IBM's new Personal System/2 do not compensate for such 'incompatibilities' as its smaller disk drives and new architecture.

"The standard as we know it will continue to strengthen," he said. "Customers have spoken loudly and clearly, and they are telling us they have come to depend on, and now require, products that meet the test of true compatibility."

He said Compaq this year will introduce at least one major product based on the 'industry standard' on which Compaq built its fortune.

Mr Canion said orders for Compaq's products were

IF YOU'VE GOT A SMART MODEM® 1200 or 123, WE WANT IT BACK.

Owners of NetComm SmartModem 1200's or 123's should be pretty pleased with themselves. They not only have state of the art auto-dial, auto-answer and auto-disconnect modems; they also have the reliability and technology which have made NetComm Australia's leading modem supplier.

However, the world hasn't stood still since you bought your modem. And now, many users require a 2400 baud full duplex facility for high speed point to point file transfer and database access. Austpac now supports 2400 too.

Well, NetComm hasn't stood still either. For just $270, (plus freight costs), we'll upgrade your SmartModem 1200 or 123 to include 2400 bps full duplex.

Just send us your modem, we'll upgrade it and return it promptly.

So now you can have a faster modem, fast. But what else would you expect from NetComm?

NetComm

Total Solutions for Data Communications

NetComm (Aust) Pty Ltd · NSW PO Box 284 Pymble NSW 2073 Tel: (02) 888 5533 Telex: AA27488MODEMS
Minerva: 07DNC002 Viatel: 288855330 VICTORIA 94 River Street South Yarra 3141 Tel: (03) 241 0534
QUEENSLAND Suite 6 Level 11 AMP Place 10 Eagle Street Brisbane Tel: (07) 229 7376

NE48FPC

stronger after IBM's April 2 product announcement than they were in March.

He also referred to Compaq's first-quarter results, released last month, in which sales rose 47 per cent to $US211 million, and profits rose 142 per cent to $US20.2 million.

Mr Canion said Compaq will aggressively defend the PC standard because of what he called misleading statements about the new products make by IBM and its corporate allies.

"There's never been a case where there's been so much smoke and dust as there is right now," said Mr Canion.

He said IBM and third-party developers that hope to sell products based on the PS/2 had overstated the attractiveness of the new machines and their operating system.

Possible licence for Micro Channel

PC makers may be able to license a key feature of IBM's Micro Channel architecture instead of duplicating it, a US analyst has claimed. Michael Murphy, editor of the California Technology Stock Letter, said IBM licensed the technology by which the Micro Channel reconfigures itself when cards are plugged into the bus. The licensee, he said, is Computer Automation of Irvine, Calif.

PC,AT VGA compatibility

Video Seven of California has announced development of a VGA-compatible chip, the Display Adaptor, set to ship in July. Developed with Cirrus Logic, it will provide Video Graphics Array compatibility for the installed base of PCs, XTs and ATs, and higher performance for Microsoft Windows and othergraphics-dependent programs, the company said. The $US595 chip will support video resolution of 800 by 500 pixels and 16 colours, he said. It will run on the PS/2 Model 30 and AT.

Borland equation solver

Borland has begun shipping, Eureka, The Solver, its long-awaited mathematical-equation solver that was announced at Comdex/Fall in November. More than a calculator, the $US99.95 equation solver can solve problems that contain undefined variables, generate tables and plots, and perform what-if analysis, according to Borland officials.

Full speed ahead for PS/2 cloners

Companies are pushing full speed ahead with plans to produce hardware and software necessary to clone IBM's new Personal System/2 computers, despite IBM's stated intention to aggressively defend the technology in the new machines.

At least three companies — Phoenix Technologies, Award Software, and Chips and Technologies — are already at work, tearing the new machines apart and figuring out how they work. Such 'reverse engineering' is the first step in creating the components that will allow manufacturers to create PS/2 compatibles.

Phoenix and Award supply compatible versions of IBM's ROM Basic Input/Output System (BIOS). Robert Stillman, executive vice president of Award Software, said his company was also working on a ROM BIOS for the PS/2s. Mr Stillman said Award would have a ROM BIOS compatible with IBM's 8086-based Model 30 by this month.

He also predicted Award would have a BIOS for the 80286-based Models 50 and 60 completed by Comdex/Fall in November.

Compatibles makers will be able to come up with an expansion bus that's compatible with IBM's new Micro Channel, Mr Stillman believes.

Moreover, he said, chipmaker Chips and Technologies will have a Model

50 and 60 compatible chip set available by the end of the year.

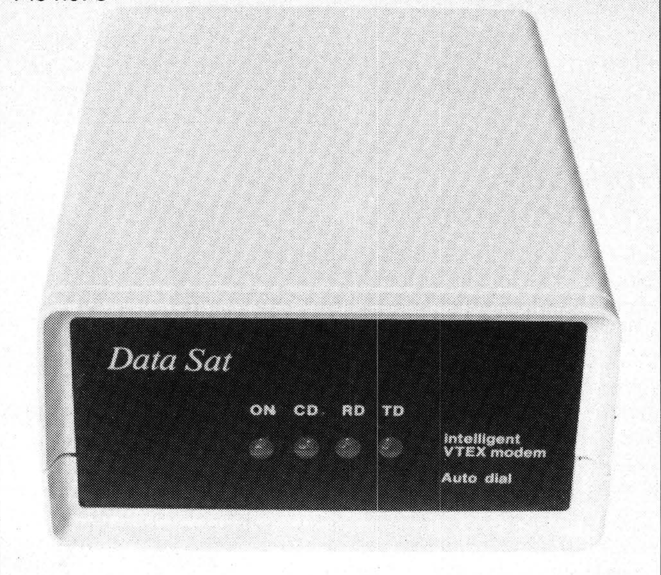
"From a technical standpoint," he said, "we think that the functions of the Micro Channel and the graphics subsystems can be duplicated."

Bob Varga, vice president of marketing at PC-compatible chip vendor and board maker Faraday Electronics, in the US, said he doesn't see any technical problems with duplicating the Micro Channel, only legal ones.

"We think that the new IBM bus is protectable," he said. "IBM has gone on record saying that it doesn't want its technology to be copied, as has happened in the past."

An IBM spokesman last month reiterated the company's position in blunt terms: "The new machines are protected by intellectual property law, such as patents, copyrights, chips designs, trademarks and trade secrets. IBM continues its practice not to license design patents, copyrighted micro code, as well as other material including trade secrets, trademarks and chip design."

Pic no. 3



Data Sat Australasia has announced the release of the Data Sat Videotex Kits, comprising either a Data Sat Intelligent VTEX Desk Modem or Intelligent VTEX Card Modem (both Telecom authorised) and the VTEX2 multi-function data communications software.

The Data Sat VTEX Intelligent Modem runs V21 or V23 and includes auto-dialling, auto-answer, auto-disconnect and Hayes compatibility.

The kit includes Neologue's VTEX2 communications software for V21/23 modems, which includes a macro command system and enables users to save a series of keystrokes or functions to a sub-menu.

The Videotex Kit has a recommended retail price including tax of $555.00 for the card modem kit and $720.00 for the desktop modem kit. Both kits include all cables and adaptors necessary.

Call Data Sat on (02) 821 1622.

New project from Kapor

Alongside the products outlined in its recent public statement of direction, Lotus Development has a number of other, closely guarded projects brewing in its labs — projects that may or may not ever see the light of day, sources close to Lotus said last month.

One project that is close to being realised is a development effort led by the company's founder, Mitch Kapor, and several other key members of the Lotus development team. Referred to as both Agenda and Oxford, the product was described by sources as a new kind of personal productivity tool for the DOS world. It functions as an automated 'to-do' list manager, allowing a user to process ideas, manage tasks and easily retrieve a mix of information.

To support these capabilities, the program incorporates highly sophisticated artificial-intelligence technology. For example, one source said, users can file notes from a conversation into a type of database where that data can be cross-referenced and joined with other information.

The sources said that the productivity product probably won't be announced until very late this year or early in 1988.

Still further down the road is a software product, currently called Notes, that is being designed by Iris Associates, a small, Lotus-funded start-up run by one of the original creators of Lotus' Symphony program.

Notes was described by sources close to Lotus as a group productivity tool for use in a network environment. It is designed to allow a group of people involved in a project to work on the same document and be kept up to date on the progress of other group members. Sources described Notes as a cross between a database and a powerful word processor.

New version of Clipper

Nantucket Software is preparing a new release of its Clipper dBase compiler that will offer optional support for dBase III Plus index files.

Called Spring '87, the new version of Clipper follows in the footsteps of the most recent Clipper version, Autumn '86, by having built-in multi-user capabilities.

When introduced in 1984, Clipper incorporated its own index file structure — dubbed NTX — instead of the NDX index structure used in Ashton-Tate's dBase. This was because Nantucket was looking for increased performance. The trade-off for this increased speed in searching indexes was the inability to use the Clipper compiler and dBase application interactively.

"Certain people like to switch back and forth in an interactive mode between dBase and a Clipper-compiled application," said Nantucket's Mr Love. "You couldn't do that before and use our [NTX] indexes. We're going to provide optional support for dBase indexes so a user can decide at the beginning of the application which format he wants to use."

Along with new index file structure, Clipper Spring '87 also boosts performance when doing a number of functions, including sorts, Mr Love said.

"One thing that [Clipper] takes a beating on in benchmark testing is that it's slower than dBase in sorting," he explained. "We have tuned that area up, as well as made our screen-handler faster."

Scheduled to be shipped next month, the Spring '87 release also would be supplemented late this year by another version of the program that would add significant new features. He added that the company had started work on a Xenix version of the product, but put it on hold until the direction of 386 Xenix, championed by Microsoft and AT&T, becomes clear.

Introducing a better way to scan images:

HP ScanJet Scanner.

It only makes sense. The company that brought you LaserJet, the world's best-selling laser printer, now brings you ScanJet, a new standard in desktop scanning.

Only ScanJet offers you so much in one package for your MS-DOS desktop publishing system. Consider ScanJet's flatbed design. It works much like your copier, letting you scan anything from wallet-sized photos to hefty, bound documents.

Plus our Scanning Gallery software makes scanning easy. Our exclusive Preview Scan lets you see your image on screen before cropping it. Then lets you size the cropped image to fit – even enlarging your original 200% or reducing it 50%. HP's ScanJet is compatible with the most popular desktop publishing and optical character recognition software, too.

What's most important, though, is the end result. ScanJet produces professional quality output by letting you input both black and white and colour photos, line art and text.

What more could you ask for? How about a price tag of only $3736* for ScanJet, Scanning Gallery software and interface kit.

We never stop asking What if...

HEWLETT PACKARD

For more information, or the name of your nearest authorised HP dealer, phone:

Sydney: 888 4444	Melbourne: 895 2895
Adelaide: 272 5911	Perth: 242 1414
Brisbane: 300 4133	Canberra: 51 6999

*Recommended retail price, plus tax if applicable.

HPY 063

Commodore chief resigns

The abrupt removal of the architect of Commodore International's financial rebound is fuelling speculation that the company may abandon its recent push into the business market.

Thomas Rattigan, the company's president and chief executive officer, resigned last month and was replaced by the chairman of the board and the firm's controlling shareholder, Irving Gould.

Mr Rattigan's departure appears to be the result of a personality conflict, analysts said, surmising that the dispute centred around the future direction of the firm.

Mr Rattigan, who was lured away from PepsiCo by Mr Gould a year ago, has been credited with bringing Commodore back from a financial abyss. The company has had three straight profitable quarters following the five losing quarters that caused the company to haemorrhage a total of $US274 million.

In the company's most recent quarter, ended December 31, 1986, Commodore earned $US22 million.

However, observers said that, as strong as Mr Rattigan was in finances, he was weak in marketing.

Commodore officials had said in the past they wanted to crack into the business market and introduce products designed to gain the company a foothold among business users.

"Mr Gould probably wants to get back into the high-volume, consumer-oriented, low-price computer market," said Samuel Navarro, managing director of technology for Ladenburg, Thalmann, an investment-banking firm in New York. "I cannot see Commodore in a business environment. [It's] basically getting squeezed, from the top by IBM and from the bottom from clone manufacturers," he said.

Hyundai PC arrives

The Sydney based SNS Group has started shipping the IBM PC-compatible Hyundai PC throughout Australasia.

The SNS Group recently secured exclusive distribution rights to the machines, to be sold in two configurations — the Super 16 and Super 16T. The basic machine, with 512k of RAM, twin 5 1/4in floppy disk drives and high- resolution mono monitor, sells for $1995, excluding tax.

The SNS Group's director of sales and marketing, Vetta Malyna, has cautioned buyers that other microcomputers marketed in Australia under the Blue Chip name may not be 'the genuine article', made by Hyundai.

Lotus news

Versions of the popular Lotus 1-2-3 release 2.01 spreadsheet are now available for the Wang and DEC PCs, according to exclusive distributor Imagineering. This version offers larger spreadsheets, new functions and extended macro facilities to users of the Rainbow 100, 100 Plus, Professional and Advanced Professional computers.

Versions of Lotus 1-2-3, Symphony, Freelance and Express are now also available in 3.5in format for the IBM PS/2 series of machines.

Ungermann-Bass links systems

Ungermann-Bass has released new software that offers file transfer and translation among a smorgasbord of mainframes, minicomputers and microcomputers from a variety of manufacturers.

UB's new Net/One Universal File Manager transfers and translates data among any combination of interconnected IBM mainframes, Digital Equipment and Hewlett-Packard minicomputers, IBM PCs and Apple Macintosh, said Darrell Miller, UB's director of marketing.

The menu-driven software allows PC users on a Net/One network to access and manipulate information on a mainframe, minicomputer or another micro without having to understand the other system's operating software, applications or log-on sequences, Mr Miller said. The software extracts data from files on one machine and translates it into a format used by the other.

For example, a PC user can access an IBM mainframe, extract data from the mainframe file, combine it with PC spreadsheet data and transfer the resulting file to a DEC VAX, he explained.

The software works with all UB's Net/One local area networks (LANs) as well as a variety of local or remote synchronous and asynchronous communications links, Mr Miller said.

The program cannot extract data from mainframe files stored in proprietary database formats, Mr Miller warned, such as those used by IBM's DB2 database-management system and other popular third party applications. To access incompatible file formats, the File Transformer must be used in conjunction with IBM or third party data-extraction software, he said.

Chip to let Mac access DOS files

In early 1988, Apple Computer will retrofit its top-of-the-line Macintosh SE and Macintosh II with a chip that allows their 3.5inch disk drives to read and write DOS-formatted diskettes, according to John Sculley, Apple's chairman.

This information came in response to questions from investors attending Hambrecht & Quist's annual technology forum last month, which focused on IBM's new Personal System/2 line of computers.

Mr Sculley said IBM's endorsement of a mouse, graphics interface and 3.5inch disk drives makes it easier for Apple to coexist with IBM.

"But you still can't share data, because it's in different formats," Mr Sculley said. That will change next year, he added, when Apple makes the new chip available.

The chip, a replacement for the unit's disk controller, is called the Integrated Sander Machine (ISM), according to sources close to Apple.

The new disk controller is not a coprocessor, which means that machines equipped with the new part cannot run DOS applications. The controller would work in tandem with programs such as Microsoft's Excel spreadsheet, which allows users to access DOS data files such as those created using Lotus 1-2-3.

Third-party coprocessor cards from the Mac II and SE are based on Intel's 80286 or 8086, and will have on board a disk controller chip that provides the same function as Apple's new chip.

dBMAN allows IBM PCs, Macs to share

VersaSoft has packed a number of new features into the next release of its dBMAN dBase-compatible database program, including the ability to share files between IBM microcomputers and Apple Macintoshes on a network.

The new multi-user database package, dBMAN version 4.0, incorporates a file structure that makes databases created in dBMAN for PC-DOS compatible with databases built in the version of dBMAN for

the Apple Macintosh, explained Charlie Tseng, president of VersaSoft.

Because of this file compatibility, both PCs and Macintoshes connected by the TOPS LAN can pass information back and forth as long as they are both running the appropriate version of dBMAN, he said.

For example, over the TOPS network, a PC user running dBMAN could directly retrieve an order-entry file from a dBMAN database on a Macintosh without having to go through any file format conversions.

The program will run on most local area networks, including IBM's Token-Ring, Novell's NetWare and 3Com's Ethernet, Mr Tseng said.

In addition to file-compatibility improvements, version 4.0 of the dBMAN program is also faster. It can update an index file of 1,000 records as much as 60 times faster than dBase III, Mr Tseng claimed.

The new release also includes support for the Transaction Tracking System as defined by Novell's NetWare network operating system.

This capability, known as fault-tolerance, ensures database integrity by automatically reversing a sequence of commands if any part of them fails to be completed.

The new release will be available in the US by the time you read this for $US595.

PC AI applications access mainframe dbs

IntelliCorp, maker of the KEE System for developing artificial intelligence (AI) applications, is readying versions of its KEE Connection and Intelliscope products that will allow PC users to communicate with mainframe databases through expert systems.

The new versions will work within Intellicorp's PC/Host delivery system, a distributed architecture that delegates between PCs and VAX mainframes from Digital Equipment (DEC), the various functions required to run a KEE AI application.

For example, PC/Host would allocate graphics and user interface functions to the PC, but divert sophisticated operations like rule-processing to the VAX.

The KEE Connection acts as a bridge between AI applications (called knowledge systems) built in the KEE System and relational databases that use Structured Query Language (SQL) as a front-end query language.

With the KEE Connection bridge in place, IntelliScope allows novice database users to query, browse and analyse database information through a graphic interface — without using SQL commands.

PC/Host implementations of KEE Connection and IntelliScope are not expected to be available before early 1988.

PC/Host itself is available now for running applications built in the KEE System.

Mac II and SE link to Ethernet

Apple Computer and 3Com announced that they have jointly developed an Ethernet network-interface card for the Macintosh II.

The card will allow direct connection of the Mac II to a 10Mbit-per-second Ethernet network.

Shipments of the card, which will be marketed by Apple as EtherTalk, will begin later this year.

According to Derek Brown, 3 Com's product manager for the EtherTalk card, Mac IIs equipped with the new card and running 3Com's

A/UX network software will now be able to participate in existing networks of PCs running 3Com's 3+ software, sharing files, exchanging mail and taking advantage of other network services.

Mac IIs equipped with the card also will be able to link to older Macs linked via the AppleTalk cabling system through a 3Com 3Server3 file servers, which has physical connections for both Ethernet and AppleTalk.

All Macintosh networks can utlilse either AppleTalk network software or 3Com's A/UX.

SNA topology changes can trap users in heavy weather

The topology of SNA networks is about to be turned inside out. If your company uses IBM-compatible computers, you had better prepare now, lest you be buried in the aftermath. By next spring, IBM should announce a new version of the communications software that drives its communications processors, the network Control Program, or NCP.

Up to now, these communications controllers were most analogous to 'switches', used to do intermediate and boundary routing of data messages between a large computer (such as a mainframe) and another computer; the other machine could be another host, a minicomputer or a personal computer.

More recently the NCP had even been enhanced to be able to support the communications processor as a node on a token-ring local area network (LAN), effectively making the 3720 or 3725 front-end processor the host interface into local as well as wide-area networks.

But what should turn network designers on their ears is the fact that PU 2.1 (with Low Entry Networking) will be added to the next new NCP.

With the new NCP, two computers could have sessions with each other through that host, buy *only if* they were connected to the same front-end processor, the same NCP.

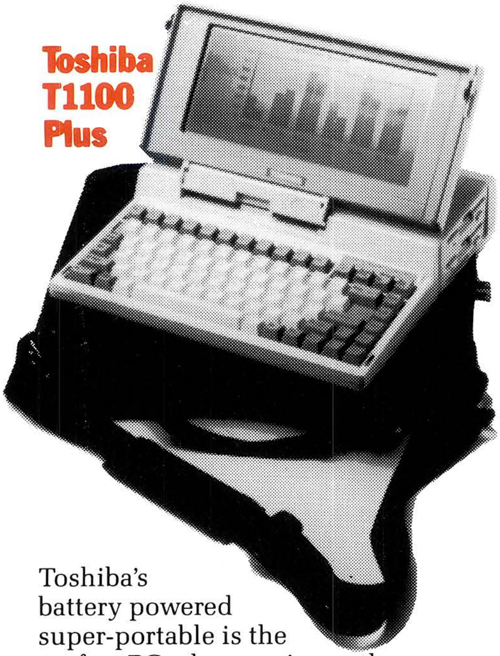
The NCP is implementing 'Low Entry Networking', previously implemented (albeit crudely) in the System/36, and sometimes referred to as Advanced Peer-to-Peer Networking. It allows two fully functional APPC nodes to have peer sessions with each other. These sessions will in nearly all cases be LU 6.2, as that is the design criterion.

This is also an important harbinger of things to come in VTAM itself. IBM will, sometime in 1988, announce that PU 2.1 support will be incorporated into VTAM. VTAM will lag behind NCP in this regard because IBM is already tying up its people in making the NCP enhancements, and even IBM's resources are limited.

The ability to have PC to PC communications occur through the VTAM network in this fashion with LU 6.2 will ultimately reduce the demand for terminal emulators, which will be unable to fully exploit these kinds of connections.

END

Toshiba T1100 Plus

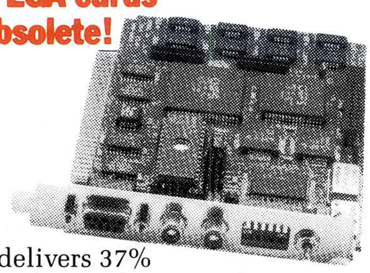


Toshiba's battery powered super-portable is the perfect PC when you're on the go: 20% lighter and smaller than IBM
- Double the processing speed – 7.16/4.77MHz switchable
- 256K RAM (expandable to 640K)
- 2 x 720K 3.5 inch microfloppies
- The latest LCD screen technology – high contrast and wide viewing angle.

NEC Powermate – the new standard in desktop PCs
Unbeatable value from NEC's new desktop powerhouse.

- Complete IBM PC/AT compatible with 8MHz 80286 CPU
- 640K RAM, upgradeable to 8.6MB
- Multisync or Power Graphics monitors automatically adjust to give you highest resolution
- CGA, EGA or Professional Graphics provide resolution up to 1120 x 750 pixels
- High speed 20 or 40MB hard disk
- 1.2MB and optional 3.5 inch microfloppy or tape backup

The VEGA card is here, all other EGA cards are obsolete!



VEGA delivers 37% more resolution than any other EGA card (when used with an NEC Multisync monitor).
- Maximum resolution of 640 x 480 or 752 x 410 pixels
- 100% compatible with all other standards including EGA, CGA, Hercules and MDA
- Fits short slot
- Complete software compatibility, or your money back
- Two year warranty

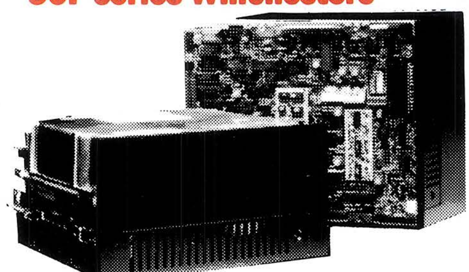
Toshiba T2100

The no compromise desktop compatible. This is Toshiba's brilliant alternative to bulky, old-fashioned PCs and XTs. The complete package is less than the size of your current briefcase.
- Superb Plasma screen delivers superior resolution to conventional monitors – 640 x 400 pixels
- High speed 8MHz 8086/2 processor delivers double the performance of a conventional PC
- Twin microfloppies (2 x 720K) or optional 10MB hard disk

Toshiba T3100

The only PC/AT that won't take over your desk.
- More power than a PC/AT in a lean 15 pound package
- High capacity hard disk and 720K microfloppy built in
- Rocket fast 8MHz 80286-2 processor

Up to 130MB capacity with Toshiba's brilliant new MK-50F series Winchesters



- Capacities of 86, 130MB unformatted (70, 105MB formattted)
- Lightening fast – 25msec random access time
- Industry standard size, mounting and interface – suit all popular PCs
- 20,000 hours MTBF
- Centre-stack dedicated servo surface

SANT TECHNOLOGY

Sant Technology Phone (02) 597 2355, (02) 588 1913. Suite 3, 58 Bay Street, Rockdale 2216

Compaq Portable III

The Compaq pedigree is first class and well established, so the company's latest luggable model, the Portable III, has every chance of succeeding in the portable PC/AT clone market. Nick Walker assesses the machine's performance.

It wouldn't be unfair to say that Compaq Computer Corporation owes its existence to IBM. It started off by being the first company to dare to produce an 8086-based and therefore improved clone of the IBM PC, and shortly followed this with the highly successful Compaq Portable — the first transportable PC-compatible.

Since then the Compaq range has broadened to include both desktop and transportable PC and AT clones, all of which are technically superior to IBM products. This strategy has turned Compaq into the youngest company to enter the Fortune 500 list of high flying companies.

Transportable computers have always formed a large proportion of Compaq sales — the original Portable I consistently outsold IBM's own transportable. Each Compaq portable has offered considerably more power than its predecessor in a smaller and lighter package. The Compaq Portable III is no exception. It boasts a 12MHz 80286 processor and up to 40Mbytes of hard disk storage in a package 40 per cent lighter and 35 per cent smaller than the Portable II.

One of the major reasons for the Compaq's 'larger- than-lapheld' design is the inclusion of a standard 5¼in disk drive

Hardware

While I have always had great admiration for Compaq machines *technically*, you could hardly describe them as works of art *aesthetically*. The Portable III is the first Compaq that looks as though some thought has gone into styling; unfortunately, the end result looks like a cross between a 1950s portable radio and a sewing machine. The power and disk access LEDs in particular could have come straight from a Wurlitzer juke-box.

When the original Compaq portable was launched, there was a clear distinction between lapheld and luggable computers. Luggable machines offered true computing power with hard disks, decent screens and expansion slots, whereas lapheld computers usually consisted of poor LCD screens and perhaps one floppy disk drive in return for true portability. However, as luggables have become smaller and laphelds more powerful, the distinction has blurred. At 40cms wide by 24cms high by 19.8cms deep and weighing 9kgs, the Compaq is best considered as a very small luggable. The upright design and small footprint make it suitable to sit on your lap.

When the machine is packed up for carrying, the only external evidence that it's a computer are three ports and a power input at the rear. On the top of the machine there is a nice, large, warm leatherette handle which makes the machine very comfortable to carry.

Setting up the Portable III when you have arrived at your destination couldn't be easier. Two clips on the front allow you to remove the keyboard to reveal the gas-plasma flat screen. An ingenious mechanism allows you to lift the screen away from the main body, and also provides some degree of tilt. This is a substantial improvement over machines such as the Sharp 7000 range or the Zenith 171 which can only be tilted. To the bottom right of the screen is a small rotary knob that controls the brightness, and below this is a hole into which the keyboard cable disappears. A trough running along the bottom of the machine houses this cable when the machine is rigged for carrying.

The rear of the Portable III houses three I/O ports, power input and an on/off switch. The three I/O ports consist of: a 25-pin Centronics parallel printer port; a 9-pin PC/AT standard RS232 serial port, usually used for a modem or mouse; and a 9-pin RGBI output giving IBM CGA colour graphic standard output. This to my mind represents the minimum acceptable collection of I/O ports, though many portables offer less. The worst case is the IBM Convertible which has none. However, I would also like to have seen a reset switch.

The Portable III operates off either 204 to 264-volt 50Hz or 102 to 132-volt 60Hz mains power, which covers must of the world's power supplies. The power supply automatically senses the incoming mains and switches accordingly, a feature I particularly appreciate after once destroying an American standard Apple Macintosh with the Australian mains.

The right-hand side of the Portable III houses one or two half-height 5¼in storage devices. On the review machines these were filled with one 1.2Mbyte floppy and one hard disk drive. The final area of interest on the outside of the machine is a hatch on the rear labelled 'expansion'. This conceals a customised version of the IBM PC/AT 16-bit expansion bus. An optional expansion unit plugged in here gives two IBM PC/AT-compatible expansion slots.

Getting inside the Portable III is relatively easy provided you possess a Torxdriver. After removing six Torx screws, the back lifts off. Inside things are, not surprisingly, quite cramped. The PCB, measuring approximately 35cms x

17.7cms, is the only thing visible once the back is removed. The power supply sits beneath it in the bottom right-hand corner. Rated at 145 watts with a peak loading of 175, this should more than adequately cope with any additional demands. In the bottom left there is an empty recess that can house an optional internal modem. The only other component that can be made out beneath the PCB is a storage cradle for the disk drives.

As you would expect in an IBM PC/AT-compatible, the main processor is an Intel 80286 true 16-bit processor. This is normally clocked at 12MHz, although it can be switched down to 8MHz presumably to be exactly compatible with the IBM PC/AT. Unless a software switch is activated to force it into either HIGH mode (12MHz) or FAST mode (8MHz), the default AUTO mode is applied (12MHz changing to 8MHz when accessing the floppy disk drive).

By switching down to 8MHz when accessing the floppy disk drive, Compaq has alleviated any problems with copy protected disks being accessed too fast. The speed of floppy data-transfer is too slow for this to affect performance. For those who require strong number-crunching ability, a socket is provided for an 8MHz 80287 maths co-processor.

The review machine was fitted with 640k of RAM made up of 256k by 1-bit DRAMS, which is both the standard and the maximum possible on the main PCB. Additional internal memory up to a maximum of 6.6Mbytes using 1MBit chips can be added by buying a memory/modem interface board and populating it with RAM chips. Like most PC compatibles the Compaq contains very little ROM; two 8k ROMs contain the basic I/O procedures, though two empty sockets allow future releases to be up to 32k.

The PCB itself is beautifully designed with a high level of customisation. The disk controller, display driver and I/O control function are each contained within large Compaq commissioned ULAs (Uncommitted Logic Arrays). There are some patch wires to be found but these don't detract from the overall quality of the PCB. Considering that no surface-mounted technology is used, the denseness of chip is particularly impressive.

There are a number of DIP switches and jumpers on the PCB which allow you to: configure the system to recognise the memory expansion boards; configure the system for additional hard and floppy disk drives; set the CPU to power up at 8MHz or 12MHz speed; change the default display; and disable or reassign the serial (COM) ports.

The Compaq Portable III comes in two models determined by alternative disk drive configurations. The cheapest Portable III, the Model 20, offers a single 1.2Mbyte/360k floppy disk supplemented by a 20Mbyte hard disk. The Model 40 is the same basic configuration but includes a 40Mbyte hard disk. The floppy drive operates perfectly in 1.2Mbyte form but is extremely unreliable when used to create 360k disks for an IBM PC (not AT) compatible. Even disks that were formatted on the straight PC clone were sometimes unreadable after files had been added by the Compaq. This was a common problem with earlier AT clones but there is no excuse for it now. Hewlett-Packard, Olivetti and Tandon all produce high density drives that reliably format and write 360k disks.

'For users of the existing Compaq Portable computers, the Portable III is a very desirable upgrade.'

The review model was fitted with a 20Mbyte hard disk which is possibly the fastest hard disk I've seen on a PC/AT clone. I tried two other disk Benchmarks and our own *APC* 'Store' Benchmark. All three confirmed that it was indeed faster than any other PC/AT disk. The drive is manufactured by Conner Peripherals and officially rated with an access time of less than 30 milliseconds. My Benchmarks suggest it is nearer 25 milliseconds.

Also of importance to users of portable machines is the shock resistance of the hard disk. On the Compaq this is achieved by the company's own shock-mounting cradle, which Compaq claims makes it capable of falling one metre without harm. I was, however, not allowed to test the validity of this claim. Two green LEDs on the top right of the machine repeat the disk drive LED so you can see when a disk is being accessed. One particularly nice touch is the floppy LED which glows green when accessing a 1.2Mbyte disk, and red when accessing a 360k disk.

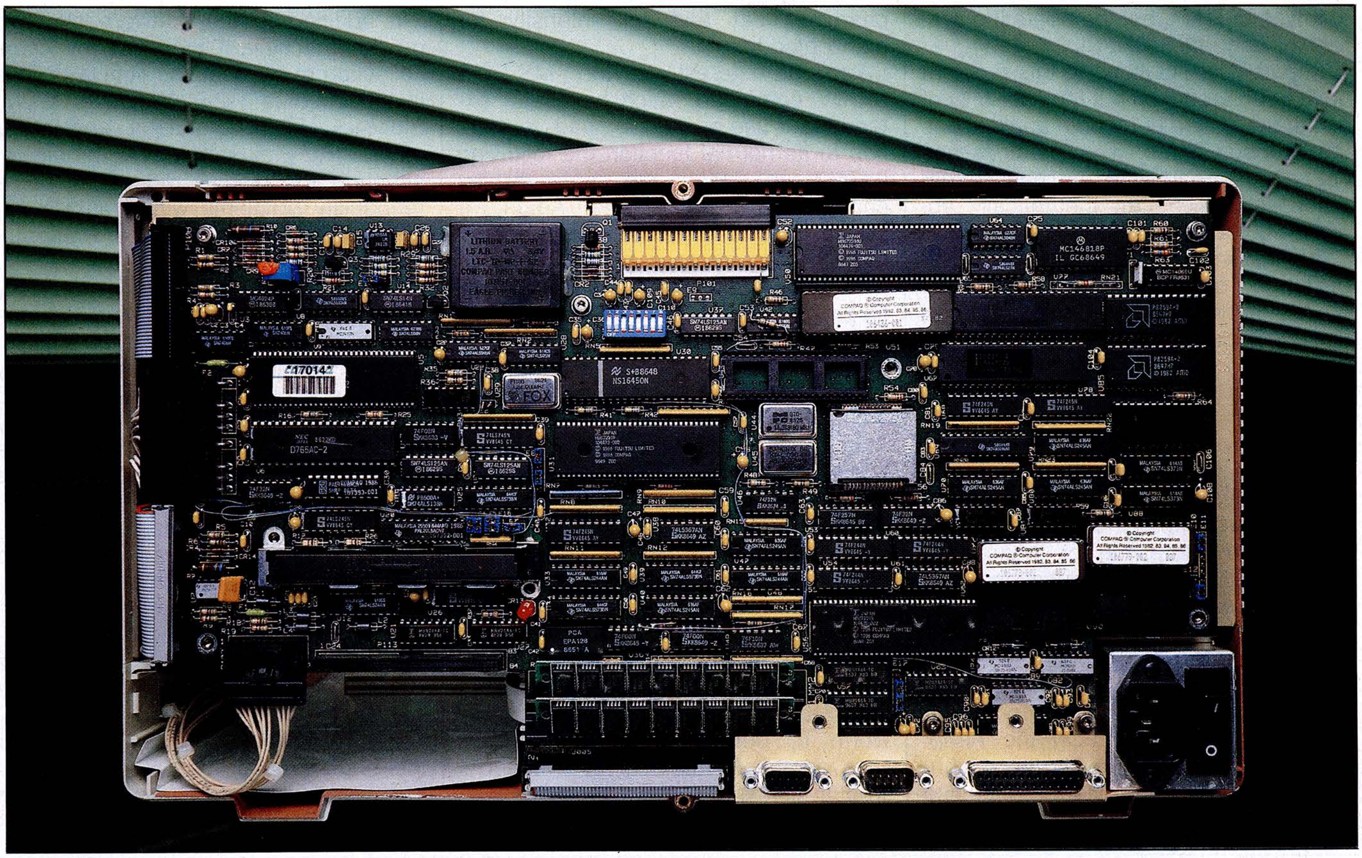
One of the reasons for the Portable III's compact size is the use of a flat gas-plasma screen. Gas-plasma displays work on a concept similar to that of a fluorescent light tube. A low pressure inert gas covers the entire screen which glows when a particular voltage is applied to it. In order to give a pixel graphics display a matrix of fine wires, one for every pixel horizontally and one for every pixel vertically is constructed behind the gas. To switch a pixel on, it is necessary to apply a voltage to both the horizontal and vertical wires. The sum of the two voltages causes the gas to glow — a process not dissimilar to the operation of the magnetic core store memory of the 1950s.

The end result is a screen that actually emits light in a similar way to a cathode ray tube but is less than 2.5cms thick and weighs less than half a kilogram. Unfortunately, gas-plasma screens are extremely power hungry which means they are rarely used in battery-powered portables. All gas-plasma displays I've seen offer orange text on a dark red background; the Compaq is no exception but it does seem to offer greater contrast compared to Toshiba, Panasonic or Ericsson displays. Unlike cathode ray tubes there is no need to continually refresh the screen — once a pixel is on, it is *on* until you switch it off. This makes text very steady but fast moving graphics tend to flicker terribly due to the time needed to switch pixels off.

One further problem with gas-plasma displays is that they offer only one level of contrast. Knowing this, I was particularly surprised to discover that the Portable III simulates both CGA colour graphics and MDA monochrome text. In order to give some degree of contrast needed for CGA emulation, the Compaq screen has two pixels for every one of a normal CGA screen (640 x 400 pixels as opposed to 640 x 200). This gives three levels of contrast to every CGA pixel: both pixels on, one pixel on and both pixels off. Using 400 pixels vertically also gives text a particularly high quality typeface and such features as true underlining.

The Compaq comes complete with three character sets and a utility for changing between fonts. Two of the fonts operate with the gas-plasma screen while the third is for use with an external monitor. The onboard CGA controller can be disabled via a jumper if you wanted to run an EGA monitor from a card in the expansion box.

The keyboard moulding is obviously smaller than that of a desktop machine. It's nice to see that Compaq has responded to the criticisms levelled at its earlier machines. Instead of the flimsy Keytronics keyboard used on the Portable I and II, the Portable III has the sturdiest keyboard I've seen on a luggable. Despite its size, the keyboard seemed to conform to the PC/AT format with ten function keys running along the top and a combined numeric keypad and cursor



An AT system board, colour graphics adaptor and hard disk controller are contained within this single PCB

cluster to the right. The Caps Lock, Num Lock and Scroll Lock keys have green LEDs to indicate when they have been activated. The keys themselves are much the same as other Compaqs — light and rather dead, but perfectly usable.

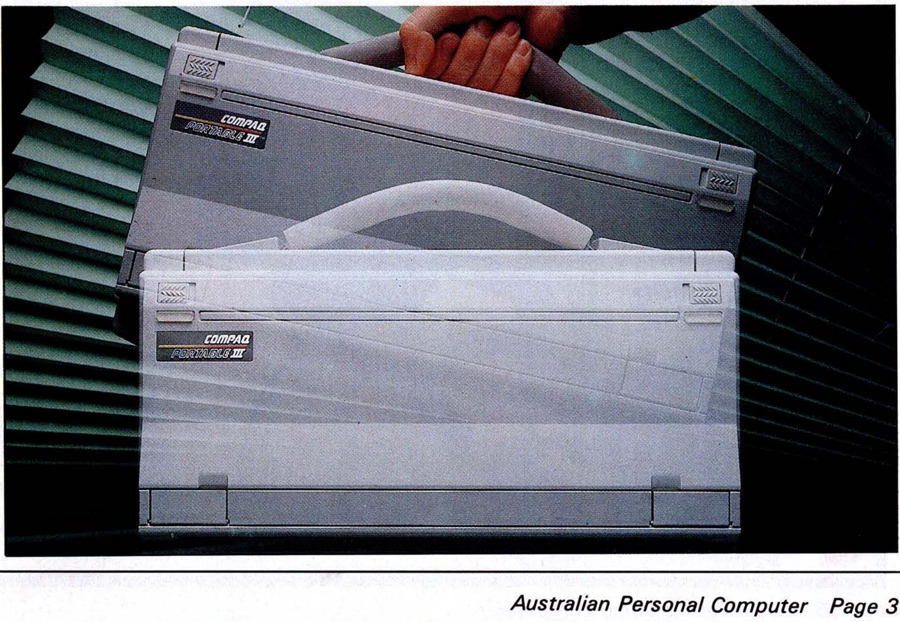
The user manual lists a wide range of options that can be added to the Compaq Portable III and these should all be available by the time you read this. These include: a 360k-only floppy disk, suggesting that Compaq knows of the unreliability of writing 360k disks in a 1.2Mbyte floppy drive; an internal 300/1200 baud NetComm modem (currently undergoing Telecom approval); an expansion unit for two IBM PC standard expansion cards; internal memory expansion boards; a Compaq colour monitor; a desktop pedestal to give more control over the display angle; and, finally, a choice of either black leather or black nylon carrying cases.

System software

As you might expect from a machine which uses an 80286 processor and professes to be a PC/AT clone, the Portable III runs MS-DOS 3.2. It seems that Compaq has modelled itself so closely on IBM that it has adopted the same silly pricing policy. MS-DOS 3.2 is not bundled with the machine but has to be purchased separately for $162. MS-DOS 3.0 was originally launched with the IBM PC/AT, and since then it has gone through two revisions: 3.1, which added a limited amount of networking capability; and 3.2, which supports 3.5in disks.

MS-DOS is not without its problems. Its most basic shortcoming is that it forces the processor inside IBM PC/ATs and clones to behave as though it were a faster version of the 8088 or 8086 chip found inside the IBM PC and clones. This means that it is not possible to take advantage of some of the 80286's more advanced features.

The most bemoaned problem is that using MS-DOS 3.2 means you cannot access more than 640k of RAM. Therefore you could have a machine with 3 or



4Mbtyes of RAM, but the operating system will only see 640k of it.

A number of solutions to this problem have been produced but they are only of use to the limited number of applications that support them. The problem has come to a head with the new 80386 processor which can theoretically access 4000Mbytes.

The recent annoucement of OS/2, designed specifically for the Intel 80286, means that it will be possible to directly address 16Mbytes of RAM as opposed to the 640k limit imposed by MS-DOS. Unfortunately, OS/2 will not be available untill 1988.

As well as being supplied with all the usual MS-DOS utilities, the Portable III comes with some Compaq custom utilities and Compaq modified utilities.

The most interesting of these is a utility called Adapt. As described earlier, using a display which has only three levels of contrast to simulate a sixteen colour graphics display is not without its problems. Adapt allows you to modify the display to suit your particular applications. On the Adapt menu are: half intensity for highlighted text; reverse video; underline highlighted text; select alternative character set and full intensity for highlighted text.

Also of interest is the MS-DOS MODE command which has been extended for use on the Compaq. In addition to its normal function the following have been added: the same display configuration abilities as Adapt; a switch for true underlining; and control over the screen save period. Compaq also supplies a comprehensive diagnostic program that can be used as a hard disk manager.

Applications software

The review machine was supplied with some applications already installed on the hard disk. This included WordStar and IBM's Writing and Graphics Assistant software and some very flashy demo programs written in Microsoft Basic.

It never ceases to amaze me that manufacturers devote such a great deal of effort to producing pretty demo programs. In this case it was probably worth it, because interpreted Basic runs on the Portable III at a speed I would normally only associate with compiled languages.

In addition to the software supplied on the machine, I tried out my usual collection of applications software. This included Lotus 1-2-3, Windows, GEM, SideKick, Flight Simulator and many others. They all ran without problems, although the display did cause some readability problems with graphics applications such as Harvard Presentation Graphics.

I also tried my selection of specially selected public-domain and games programs on the Portable III. Public-domain programs are often a very good test of compatibility, as they tend to be written in a quick and dirty fashion and are intolerant of hardware incompatibility. Over the years I have collected a number of the most incompatible of these programs.

Using these programs I discovered two areas where the Compaq is incompatible. The first and the least surprising is the display driver. Certain fast-moving graphical games such as Decathlon from Activision cause the screen to lock up; the program continues to run but the only way to clear the screen is to re-boot the system. The second and more peculiar problem occurs with a public-domain program

Benchmarks

Intmath	1.1secs
Realmath	1.3secs
Triglog	5.2secs
Textscrn	27.3secs
Grafscrn	6.1secs
Store	2.7secs

For a full explanation of the APC Benchmarks, see the November 1986 issue.

called Slowdown. This slows the processor with NOPs (no operation, null instruction) so that timing-critical programs can run at an acceptable speed.

For some inexplicable reason, some programs that ran fine without Slowdown totally failed when Slowdown was activated. Compaq initially blamed this on Slowdown itself, but after explaining it worked fine on other machines, conceded that it might have something to do with the timing of the disk controller.

When you purchase MS-DOS 3.2 you will also be supplied with Microsoft Basic version 3. This is not the place for a review of Basic 3's features, but it does seem to represent a marked improvement over GWBasic which is supplied with most other IBM compatibles.

When a file is accessed using the 'Open' command, it can now be 'Shared' — allowing other processes to read and write to the file; and 'Lock Write' stops another process writing to the file. Basic 3 also has a 'Lock' command which allows record-locking as opposed to the file-locking provided by the 'Open' statement. This in theory should allow you to produce true multi-user network applications in Basic.

Documentation

The review machine was supplied with one *Users' Guide* manual, although you should also receive an MS-DOS manual and Basic manual when you purchase the operating system. A *Technical Reference Guide* is also available and costs $168.

Price

The Model 20 costs $9671 and the Model 40 $11,180. Prices for the various options include: $375 for the expansion chasis (giving two 16-bit slots), $458 for the 6.6Mbyte expansion board, $458 for the 512k memory module, $2549 for the 2Mbyte memory module, $995 for the NetComm internal modem, $179 for the desktop pedestal, $548 for the 360k floppy drive, $391 for the leather carrying case and $168 for the nylon case.

Conclusion

For users of the existing Compaq Portable computers, the Portable III is a very desirable upgrade. The machine is lighter, smaller and much faster than its older sibling, the Portable II. However, the Portable III remains very much a luggable and the traditional benefits of luggables — expandability, a decent screen and hard disk — have been somewhat eroded by recent developments of lapheld-computer manufacturers.

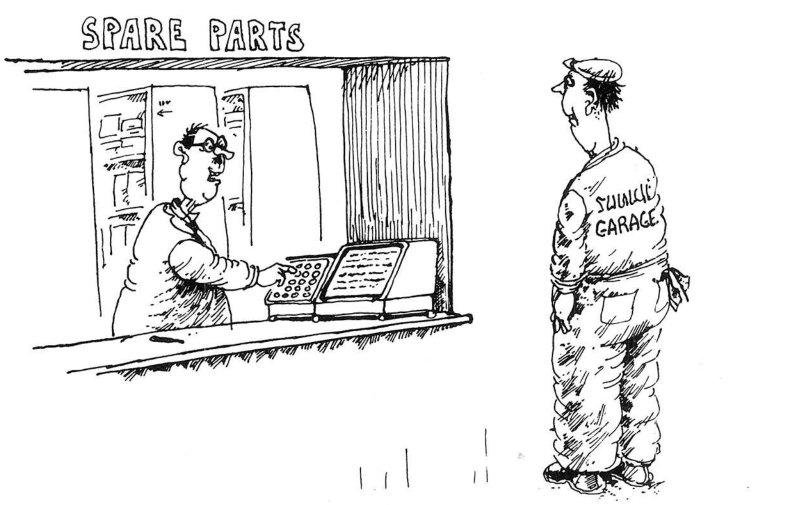
Probably the most obvious lapheld rival to the Compaq Portable is the Toshiba 3100/20. This offers a very similar specification: a 20Mbyte hard disk, 640k of RAM and a gas-plasma screen in a casing that will (just) fit in an average briefcase. One cannot resist suggesting that the Portable III is an attempt by Compaq to regain some of the sales it has lost to this popular Toshiba model.

All in all there is little to differentiate between the Toshiba and the Compaq. The Toshiba is considerably smaller and more stylish, but Compaq has the greater reputation and the more powerful machine. My personal preference is for the Toshiba, but there's very little in it.

END

Technical specifications

Processor:	Intel 80286 running at 12MHz, switchable to 8MHz
ROM:	16k
RAM:	640k expandable to 6.6Mbytes internally
Mass storage:	One 20Mbyte hard disk, one 1.2Mbyte/360k floppy
Keyboard	84-key, full-stroke IBM PC/AT-like layout
Screen:	25-lines x 80-column text, 640 x 400 pixel graphics, gas- plasma
Size:	24cm x 19.8cm x 40cm
Weight:	9kgs
I/O:	RS232 9-pin serial, parallel Centronics, RGBI monitor output
Operating system:	MS-DOS version 3.2
Bundled software:	None
Peripherals:	(all optional) internal 40Mbyte hard disk; internal 360k floppy; internal modem; expansion unit; internal expansion board; 512k memory modules; 2Mbyte memory modules; 80287 numeric co-processor; colour monitor; EGA card; desktop pedestal; carrying case



'It tells you the part number, whether it's in stock, and how many cuts and grazes you'll get trying to fit it.'

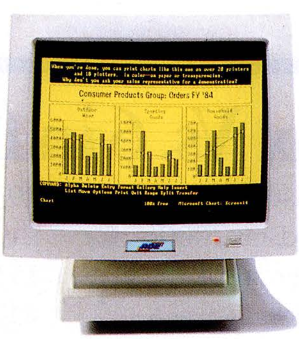
Multi-User Multi-Tasking

AT/286
AT/286
AT/286
AT/286
AT/286

OPAL = AT/286

Business Personal Computer

Priced from $3000 + tax



MAIN FEATURES:

- 80286 Microprocessor, 6.0/8.0 MHz clock Switchable.
- 80287 Math-coprocessor optional.
- 8 Expansion slot, fully compatible with IBM PC/AT.
- 640KB RAM Standard on mother board, Max. expandable to 15MB.
- Real time clock/calendar with battery back-up.
- Serial and parallel port.
- RGB Color or TTL monochrome display, optional.
- Made in Japan.
- Double-sided 1.2MB high-density 5-1/4" floppy disk drive, second FDD optional.
- Sturdy metal case.
- 84 keys standard keyboard (100 keys advanced keyboard optional)
- 200W Power supply.
- 5-1/4" 20MB Hard disk, optional.
- O.S. MS-DOS 3.2, XENIX, optional.
- Hardware & software compatible with IBM PC/AT*

ADE

Toll free order Hot Line
(008) 03 3508

ADE COMPUTERS PTY. LTD.
28 Haughton Road, Oakleigh,
Victoria, Australia, 3166
TEL:(03)568-7877
TELEX:AA36384

* Registered Trade Mark International Business Machines.

Great

(Great

If you have the Ability, what you have are 6 high-powered, quality applications in a single, easy-to-use, integrated package. And if you think that's great, wait till you see the great little price tag.

$199 including sales tax! Without losing any quality, you're saving at least $100 on anything comparable. This introductory offer lasts until June 30 only at participating I.S.D. dealers.

For $199 you have the Ability to do: WORD PROCESSING with no control characters on screen. What you see is what you get. SPREADSHEETS 3 x larger than Symphony. (702 col x 9999 rows).

DATABASE can store 65000 records and can move all or part of the spreadsheet into your database. BUSINESS GRAPHICS Bar, line and pie charts, automatically updated as you change database or spreadsheet data. COMMUNICATIONS Allows easy file and data exchange with other computers.

Six Vs. 6 in 1*

Dbase 3	$935
Wordstar 2000	$495
Supercalc 4	$539
Crosstalk	$170
Harvard Presentation Graphics	$499
Domino	$370
TOTAL	**$3008**
MIGENT ABILITY	**$199**
SAVE	**$2809**

* Based on average retail prices for May 1987.

Ability

Price)

PRESENTATION
Enables you to take "snap-shots" of the monitor screen, which can be mounted for slide-show demos.

Ability runs on all IBM PC compatibles, and has the power and quality to meet most conceivable small business needs. All communications are menu driven.

Ability isn't our only quality. Others are such value for money business software products as:

In-House Accountant. $199
(Special offer to June 30 only.) Makes bookkeeping painless.

Fleet Street Editor. $499.
Quality desk-top publishing.

Portex. $299.
The quality integrated personal organiser with address book, diary and word-processing with built-in spelling correction.

Zorland C. $99.
Beats Lattice and Microsoft hands-down. The quality Lattice-compatible C compiler.

*Dealer enquiries: Paul Denyer at I.S.D. on (03) 222 2288.

Give me the Ability...
I want to know exactly what ability Ability has. Please send me a demo disk. The Ability Demo Disk costs only $3, including postage, which we will refund when you buy Ability.

Name:________________

Address:________________

____

When filled in, please send this coupon to:
International Software Distributors Pty. Ltd.,
34 Wadhurst Drive,
Knoxfield. Victoria. 3180.

ISD001

For once, the designers and the DP Managers have something to agree on.

Wyse terminals. For the first time ever, superior functions and ergonomics come in an elegant, eye-catching package. And offer the best value for money on the market.

And the same uncompromising standards continue throughout the range: ASCII, ANSI, mono, colour, entry level through to top-of- the-line.

Could this be why Wyse is the most popular independently-manufactured terminal in the world today?

For the name of your nearest Authorised Wyse Dealer, please call Kathy Ricketts on (02) 697 8664 or Keshav Mirchandaney on (03) 690 9022.

☐ Please send me more information on Wyse terminals
☐ Please organise for a dealer to contact me.
Nominate preferred dealer ____________
NAME ____________
TITLE ____________
COMPANY ____________
ADDRESS ____________
____________ POSTCODE ____________
Send to: Imagineering, 77 Dunning Ave, ROSEBERY NSW 2018.
IM014

WYSE™

Get Wyse
Call Imagineering

IMAGINEERING™
· WYSE DIVISION ·

77 Dunning Ave, Rosebery, NSW 2018. Ph: (02) 697 8666
Ground Floor, 51-53 Park St, South Melbourne, VIC 3205. Ph: (03) 690 9022
Unit 3, 249 Coronation Dr, Milton, QLD 4064. Ph: (07) 369 2911

Imagineering is a Division of Studio Australia Pty Ltd

Listen and Learn

A newly purchased software program often means a lot of time and costly training of staff if optimum productivity is to be achieved. Listen & Learn, an Australian company has released an efficient alternative to staff training. Kester Cranswick reports.

Opening up a software package can be a frightening experience to the novice. With cellophane torn off, out falls an assortment of disks, various cards, and manuals thick enough to prop up a car. 'How', you ask, 'can you ever get through it all'?

Good software should have a tutorial built into it. Load the application, run the tutorial, and in an hour or so, you should be familiar with the main features of the package. Tutorials are a relatively recent phenomenum though.

Not-so-good software will have documentation for different levels of users, from the beginner to the advanced user. Wading through that is a daunting task, especially if you aren't familiar with computers and software.

Bad software leaves you pretty much to your own devices and, let's face it, unless you know how to use your chosen software, you might as well not bother buying it.

Learning to use popular packages, such as WordStar, Lotus 1-2-3 and dBase III is an activity that has generated an enormous business. There are books, programs, courses, consultants, videos, laser disks and audio cassettes. With such a plethora of training options to choose from, it is difficult to know where to turn.

Classes are popular. Unfortunately, they make it expensive to train a large number of people, and there is no guarantee that what is taught will be absorbed. Ideally, you need something that can be given to anybody, so he or she can teach themself. Books and cassettes are the most common medium.

The trouble with so many books and tapes is that they come from overseas. They feature the voices of brash Yanks or plummy Poms, neither of which can play a decent game of football. They use examples in foreign currencies, or with a definite overseas flavour. That alienates many students. Local product is pretty thin on the ground.

Perth, in the golden West, is where these tape tutors have come from. They are two of a growing range that goes under the brand name Listen and Learn, from a company of the same name. Listen and Learn is half-funded by the 12 months old venture capital company, Stinoc Pty Ltd, the Management Investment Company headed up by Laurie Wilson, of Wilson car parks, and much more. With that sort of backing, Listen and Learn is no fly-by-nighter.

For review, I had what will probably be the two most popular packs in the range, tutorials on Lotus 1-2-3 Release 2.0 and WordStar. Other tutorials currently available deal with Multimate, dBase III Plus and DisplayWrite 3. Very soon, tutorials for Word, Word Perfect and Multiplan will be released.

Each pack costs $129. For that you get a ringbound instruction manual and a set of four cassette tapes, bearing eight half hour lessons. If you don't have ready access to a cassette player, $199 will get you the same package plus a Walkman-style cassette player and headphones.

There is also an MS-DOS tutorial, with just two tapes, costing $99.

Packaging is excellent. The container is a little bigger than a VHS video cassette holder, with a glossy cover. The manual fits in the left hand side, and the four cassettes are snugly located on the right. It looks and feels a quality product.

Development

According to the Listen and Learn, the tapes took four years of research and development by two educators at a private school in Perth, and testing by 300 people, before the packages were released.

They had come to the not unoriginal conclusion that 'many would- be users have either failed to progress beyond the starting point of traditional instruction and become daunted, of have simply under utilised their expensive hardware to the point where they have become highly expensive word processors with only nominal productivity,' according to Listen and Learn's marketing consultant, John Ventouras.

What's the justification for audio tui-

tion? Let's hear it from the introductory blurb on lesson one of the WordStar package. 'The makers of this product are convinced that the most productive and the most enjoyable way to learn is to cater to the two primary senses of sight and sound. The adaptation of the language teaching method to the field of computers seemed to be a logical step, considering the frustrations felt by those attempting to learn computer software from books or manuals'. I can't argue with that.

The tape goes on to point out that, with tape, you control the pace at which you learn. You can learn in the privacy of your office, at home, or with friends, using a standard cassette player and no headphones. Each course, it is claimed, takes 10 to 20 hours to complete. That is no exaggeration, and it means that a course can be done in a weekend.

The tapes are simplicity itself to use. Load the first one, press the cassette player's play button, and you'll hear a musical introduction, followed by the measured tones of a male tutor. He explains the purpose of the tapes, and that a bell-like chime indicates when to pause the tape and do something at the keyboard.

The tutors assume no knowledge on the part of the user, about either the computer keyboard, or how to use the tapes. For instance, you are told to do all the assignments given in the lessons, not to skip sections, and that repetitive exercises reinforce the learning process.

Documentation

Accompanying the tapes is a colour coded manual. Each of the four cassettes has a label in a different colour, and these colours are repeated at the bottom of the pages in the manual. With the cover of the manuals folded back, it stands upright and takes up precious little deskspace.

Besides the colour coded lesson material, there is a short introductory section about the efficacy of tapes (there's plenty of positive reinforcement that you have done the right thing by investing in the tape tutorials), a section identifying the all-important keys of the PC keyboard, plus a number of appendices.

In the case of the WordStar package, the appendices in the 43-page manual deal with loading the application, non-IBM keyboard equivalents of IBM keys, examples of opening and main menus, a list of WordStar commands and symbols, dot commands and a set of extra exercises. There are some blank pages for notes too. The Lotus manual, thicker at 68 pages, has appendices that deal with functions, grouped by type, and the formulae used in some of the exercises. There is no information on firing up the application, as that depends on the computer.

In use

Let's run through what you are taught in each tutorial, starting with WordStar. On each tape, an electronic musical overture is the first thing to greet the ears. Before Lesson one there is an introduction and details on how to use the tape and manual, all of which goes on for longer than the intelligent user might need.

Lesson one explains, briefly, the place of WordStar in the software kingdom, and starts with the opening menu. That is described, and the way it works explained. Opening and saving documents, setting help levels, moving the cursor and deleting characters, lines or sentences is covered. Other material covered includes the Caps Lock and Shift keys. When you are asked to press a key, the tape has a background recording of a key being pressed — all very reassuring.

'After the tuition, it is up to the student to actually use the facilities he or she has been taught, and to re-do any lessons that have not been absorbed.

The manual also details how to move the cursor, deleting lines and characters, and creating or saving documents. There is a a short task about Australian geography and a 300-word assignment about tornadoes. By this stage, you'll be able to enter text and correct typing errors. There's also the invaluable tip about regularly saving work, in case of a disaster.

Lesson two moves on a little, and introduces the concepts of insertion, block marking and hiding, movement and copying. Tasks and assignments reinforce the tutorial material. Throughout the lessons, the tutor's voice is slow enough to understand, not too ocker, and reassuringly calm. The pace is steady too, and you won't feel you're being pulled helter skelter through a maze of complicated features.

Lesson three takes the student to page formatting, including margin setting, indenting paragraphs, line centring and paragraph reformating.

Moving on to lesson four, you are introduced to tabs and tab settings, word wrap and scrolling text. Lesson five, half way through the course, is all to do with page designing. It deals with underlining, bold print, superscript, subscript, striking out, double striking and seeing control codes.

Lesson six tackles the subjects of finding and replacing character strings, wild cards in search strings, and options to these commands such as global search, whole word, upper case ignore and so on.

Lesson seven moves outside WordStar into the areas of MailMerge and SpellStar, if you have them, and non-document data files. Finally, lesson eight is a collection of miscellaneous information — renaming, copying and deleting files, function key commands not already covered, assorted cursor movement commands, headers and footers and conversion of non-document to document files.

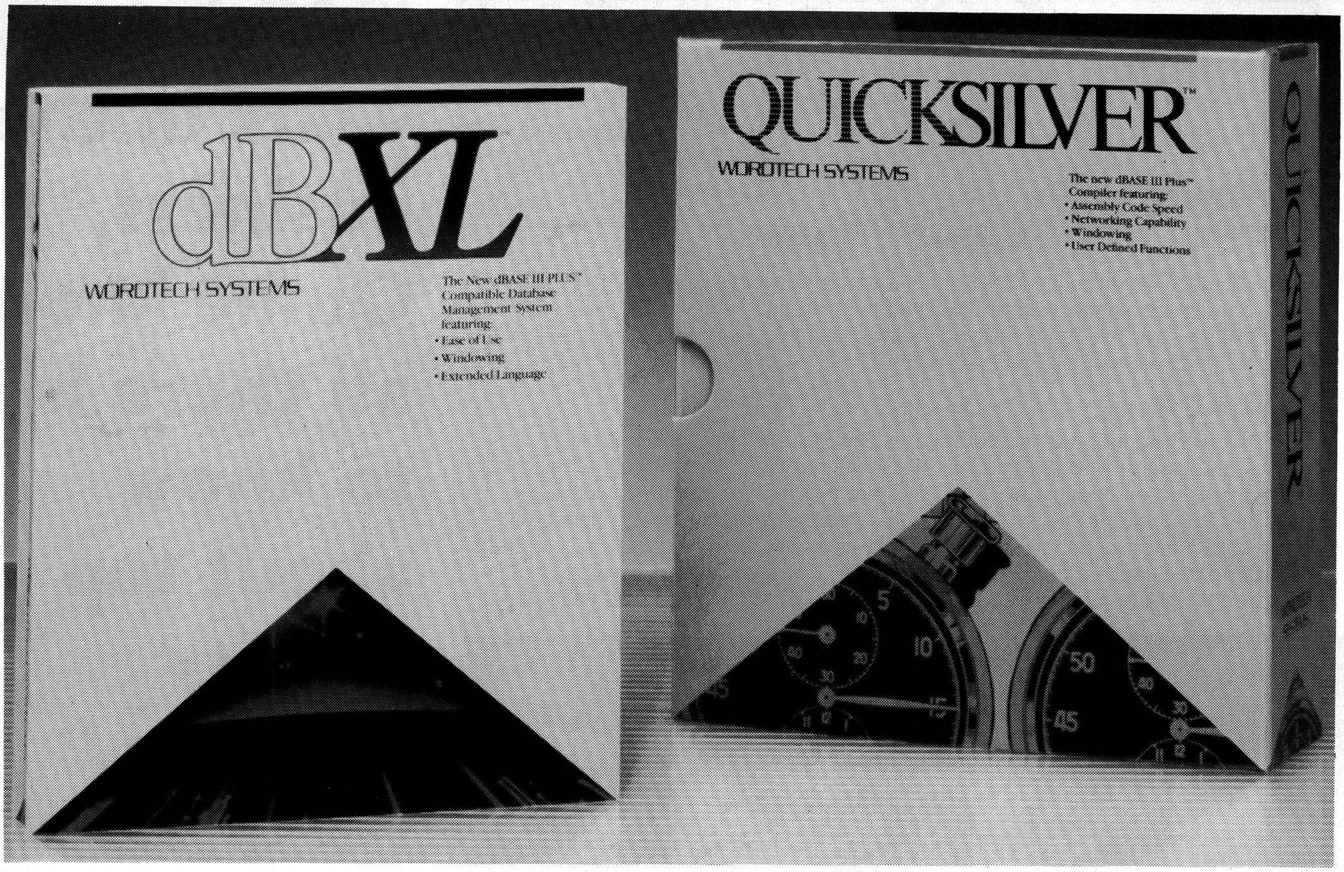
Where does all that leave the novice user? In a competent position indeed, on the subject of WordStar. After the tuition, it is up to the student to actually use the facilities he or she has been taught, and to re-do any lessons that have not been absorbed. A weekend spent with your computer and these cassettes should have you ready to start word processing with no fears about what to do.

Lotus 1-2-3

The Lotus tuition pack has a more complex task to put across. Lesson one, once it gets past the introduction, familiarises the user with the opening access system of 1-2-3, and the concept of a spreadsheet and cells. Moving the cursor is the first subject. Then it is onto the all important Help screens and Esc key, followed by text entry, left and right justification of text, loading and saving files, erasing worksheets, editing and the Sum command. Listen carefully, as there are plenty of examples to give you practice.

Lesson two gets into spreadsheet formats, functions and heading justification.

Some examples have a distinctly Western Australian feel, with football results from the WAFL and Perth temperature charts. Others are more



dBASE SUPERPOWER

dBXL

The dBASE III Plus "Superclone".

Just as you can buy two versions or more of programs like BASIC, you can now buy two versions of dBASE power.

dBXL has INTRO, a user-friendly Help facility for the new users. The documentation is excellent.

dBXL has many new and powerful features: windowing, automem, access to DOS commands, DOS interrupt support, create indexes in DESCENDING or ASCENDING order etc.

dBXL offers all the power, functionality, and performance of dBASE III Plus for a fraction of the price.

dBXL runs on PC-DOS and Generic MS-DOS.

dBCHART presents data from dBASE II and III files in graphic forms. Options are available to allow the presentation of charts in many graphic formats and colour combinations.

QUICKSILVER

The first compiler for dBASE III Plus.

Quicksilver compiles your dBASE III Plus programs into machine code that runs almost at the "speed of light".

Quicksilver offers full compatibility, ease of use, UDF's, dBASE Tools for C support, LAN support, and dBXL extended syntax support. No more License Fees.

Quicksilver will run on PC-DOS and MS-DOS.

dB COMPILER

The first true compiler for dBASE II. No more License fees, substantial speed improvements, 96 memory variables, plus several new features.

dB COMPILER runs on CPM, MS/PC-DOS.

TEL: (02) 745 1995
TLX: AA 27749

TOOLS FOR THINKING SINCE 1983

micro data management systems

• Consulting • Project Management • Custom Systems Design • Programming • Software Distributors

AUSTRALIAN DISTRIBUTOR

Products trademarked by others:
Ashton-Tate, Inc. : dBASE II, dBASE III, dBASE III Plus, and dBASE Tools for C.
Microsoft, Inc. : MS-DOS, IBM : PC-DOS, Digital Research : CPM
WordTech Systems: dB Compiler, dBXL, Quicksilver under license from Quicksilver Software Inc.

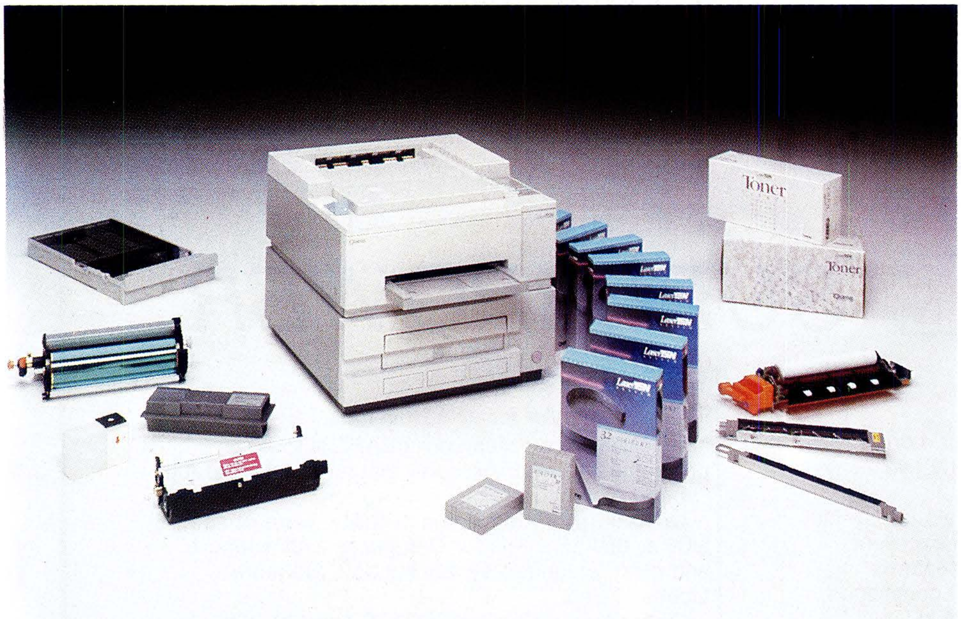
C&PA

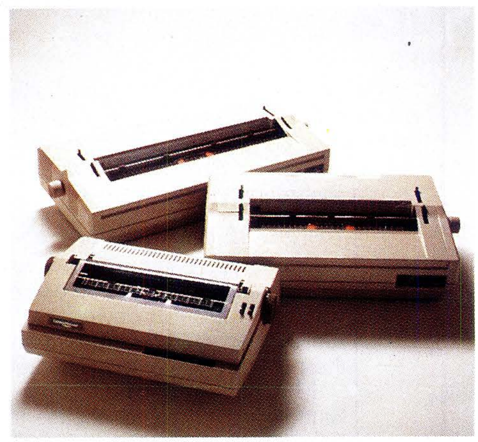
"With ten years in the business, Qume knows all there is to know about top quality printing."

Whether you produce a few letters a day or thousands, Qume's range of letter quality printers can handle it. From the low cost LetterPro range to the power of the LaserTEN we have the printer for you. All with Qume's legendary reliability. All sold and supported nationally by C&PA.

The LaserTEN

If you're producing up to 5,000 pages a month and the highest quality is essential, the LaserTEN is the solution. This is the first laser printer designed specifically as a high production business machine for either individual or multi-user computer systems. It will fit efforlessly into your business and start working for you right away. Simple plug-in interface modules make it compatible with all major business computers and word processors. Emulations of popular laser, daisywheel and dot matrix printers eliminate software modifications. It will feed three sizes of paper, film and envelopes.





LetterPro personal printers

Top quality daisywheel printing is now affordable by even the smallest business. The LetterPro 20 is Qume's lowest priced daisywheel printer. Yet it still delivers crisp, clear printing at a full 22 characters per second.

And if you need higher output without the high price tag, the LetterPro PLUS is the answer. It prints at a fast 45 characters per second and has an 8K buffer memory that can handle up to four pages of text. And thanks to built-in Centronics and RS-232 interfaces, one LetterPro PLUS can be used with a variety of systems.

Both LetterPros use widely available Qume ribbons and daisywheels (with a choice of over 100 different typestyles).

SPRINT 11/90 Plus

You can't buy a faster daisywheel printer.
At 90 characters per second, the SPRINT 11/90 PLUS is nearly as fast as a dot-matrix printer, but with the high quality of a daisywheel. And this incredible speed doesn't sacrifice anything in quality or reliability. Its reliability rating is almost a year longer than any other letter quality printer, regardless of speed.

Qume accessories to make life easier.

You don't want to spend your life feeding your printer, so every Qume printer has a range of paper handling options. Single and dual bin sheet feeders, tractor feeds, letter guides. All become part of your printer and operate without changing software.

Sold and supported nationally by C&PA.

All Qume printers from C&PA have one thing in common. National support. For sales, installation and advice. So no matter where you are, if there's a problem we'll be right there to solve it.

For full details and to arrange a demonstration, call your nearest C&PA office today.

C&PA

C&PA. Around the country.

Qld 25 Harvton Street, Stafford 4053. Tel: (07) 352 5788
NSW 9 Pioneer Ave., Thornleigh 2120. Tel: (02) 848 8533
S.A. 65 Manton St., Hindmarsh 5007. Tel: (08) 46 4062
Vic. 25 Hardner Rd., Mt Waverley 3149. Tel: (03) 544 3444
W.A. 110 Charles St., West Perth 6005. Tel: (09) 328 1533
A.C.T. Unit 1, G3A Pirie St., Fyshwick 2609. Tel: (062) 80 4801

THE FARWAGI COMPANY 6388A

practical, such as small business and budget spreadsheets. Lesson three deals with getting headings and data into the same spreadsheet, plus the system status and printer set-up screens.

In lesson four the student is introduced to neatening spreadsheets through formatting, and more complex tasks. The next lesson, data management, is about sorting data, date arithmetic, data distribution and simple graphic presentation of data.

'The tapes have the advantage of not tieing up an experienced user in the organisation to guide a new user through his or her first few hours at the screen.'

Lesson six takes the graphic ideas a little further, as well as introducing percentage and comma formats and the use of text in spreadsheets. The penultimate lesson is about the interaction between Lotus and other applications, such as WordStar, Multimate, Microsoft Word, and spreadsheet translation for other spreadsheet packages.

The final lesson is again an assortment of items, to do with increasing the power of your spreadsheets.

The major difference between the Lotus and WordStar packs is the intensity of the tuition. Lotus is a far more complex application, and relies more on the tutor explaining how to achieve certain things. With the WordStar package, there are fewer concepts to put across, and word processing is not as computer intensive as spreadsheet work.

The manuals differ too. The WordStar manual is more a visual record of the lessons, with the tasks printed, while the Lotus manual provides all the data for the spreadsheets, and illustrates what should happen if you do what you are told. A slight failing is that examples are shown just as printed words on the page. Screen dumps would have added an air of greater realism to the manual, and might be of more assistance to the student.

The Lotus manual also lists the formulae used in the various lessons, so that errors can be spotted. That sort of attention to detail is not necessary with the WordStar tutorial.

What can you hope to achieve by buying and trying these tutorials? It depends on your level of competence with the application in question.

For the complete beginner, these tapes are probably all that's necessary to get a user familiar enough with the product to start using it with confidence. Of course, there is much more to learn, particularly with a product like Lotus, but part of the art of learning software is to get started, without feeling like an absolute bimbo.

The tapes have the advantage of not tying up an experienced user in the organisation to guide a new user through his or her first few hours at the screen. They can also be used at home, and each lesson is short enough to be completed in a mealbreak.

The important thing, for the student, is to get on with using the application. A lesson is quickly forgotten if the principles are not put into practice. Then, when the basics come as second nature, it might be time to move onto more advanced material, such as classes on advanced usage, books, or user groups.

Conclusion

For an organisation with a number of people to train in popular PC applications, the tapes represent a nice balance between cost and efficiency. The price at $129 is almost a petty cash sum, and the tapes can be used over and over again by different people. And, being tapes, rather than disks, they are likely to be returned to the training officer, rather than kept for a rainy day.

Listen and Learn has high hopes for the range. According to John Ventouras, they will initially be aimed at users in Australia, New Zealand and the Pacific Rim. He also says the company has had enquiries from as far afield as the UK and Japan. They are distributed nationally through Dick Smith Electronics.

The concept is not new, that's for sure. It is good to see though that an Australian company has taken the initiative, come up with a quality local product, at an affordable price, that should be bought by any organisation that has a sizeable PC user base, and is wondering how to train users in the most common applications.

END

Listen & Learn training packages cost $129 and are available from Listen & Learn, PO Box 902, Subiaco WA 6008. Tel: (09) 382 4984 or Dick Smith Electronics Stores.

A new tune on an old fiddle

The conventional word processor has hidden talents, as Mike Harrison discovered when he found he could create flowcharts using the WP's inherent macro and typeover features. Here he draws his conclusions.

Personal computers are becoming the universal tool of business but, until recently, word processor and spreadsheet programs have accounted for the largest part of the national investment in software. Now these general programs face increasing competition from software with other talents. Communications, simulation and graphics packages jostle with more specialised software that can tackle anything from projections to planning or from graphics to games. The trouble is that you can easily spend a fortune on software and a lifetime in training if you rush out to buy a program, every time you hit a new problem. And you can find yourself picking a specialist package before you have had time to evaluate either it or your needs.

The great virtue of general programs is that they provide very cost effective tools — if you take the trouble to learn what they can do and are able to apply a bit of ingenuity to their use. The versatility of spreadsheets is well known, but word processors have hidden talents too.

Creating flowcharts

My work as a producer of interactive video demands lots of flowcharts. Interactive video gives a computer a new peripheral — a video disc player. The disc player provides picture and sound sequences in response to inputs from the user and decisions by the computer. When you're writing a program for this combination, flowcharts form a vital part of the script. They deal with the organisation of ideas and with the control processes. All the elements of branching that are food and drink to a mainstream software programmer are there, as are the familiar flowchart symbols.

Interactive video handles complex ideas for demanding clients. It draws

What are macros?

Macros show personal computing at its best; handing you the ability to tuck away bits of success for re-use as many times as they're needed. And you don't have to be a dedicated hacker or enjoy typing long pieces of code to be a macro user — they're accessible to anyone who will take the trouble to open the manual for their word processor.

The macro function makes use of an area of the computer memory which is allocated to hold pre-determined keystrokes. In most respectable packages, the contents of this volatile memory can also be held in permanent storage — on hard or floppy disk — so that the toil of putting the strings of characters into the macro is a once-only task.

You get a macro into the machine by 'recording' a sequence of keystrokes. You get it back by putting the cursor where you want the sequence to begin and entering a short-hand command — something like "{ALT-Y}", perhaps, for:

"Yours sincerely,{return}Algernon Higginbotham,{return}Managing Director".

In this case, the command {ALT-Y} sends the machine to look in the appropriate memory section where it finds the pre-recorded sign-off message and dumps it at the cursor position. Each package has its own command structure for recording and recalling macros, but the principle is always the same.

One very important feature which is available in the best programs is the ability to call one macro from another. The great advantage is that you can then build from relatively simple building blocks. You might, for example, use a macro to add a standard sign-off paragraph to contractual letters — perhaps:

'While we have made every effort to ensure that the information provided is correct, we hope you will understand that we reserve the right to make amendments at any time up to the signature of contract.{return}{ALT-Y}'.

The effect of calling this macro would be to lay down the contract paragraph, followed by the usual 'Yours sincerely, etc' provided by {ALT-Y}.

Macros don't have to be purely textual. Most packages allow them to contain all kinds of commands — usually anything that can be entered from the keyboard. This is what makes drawing with macros so convenient. To draw a symbol you have to use the cursor position commands to place characters in the appropriate pattern. The macro saves repeating this horrid job, which involves much awkward fiddling to get the things to look right. The best method is to sketch on the screen first, before making the macro, by overtyping symbols on a page full of spaces until you get the appearance you want. You can use this sketch as a template over which you re-type while recording the macro.

This is a particular instance where calling macros from within each other is helpful. Macros for vertical lines and horizontal lines can be combined to make boxes, boxes

together a team with a wide range of professional talents. With so much intellectual fire-power brought to bear on the programs, flowcharts go through many stages of revision. If we're not to spend all of our time re-working them and none making the video itself, I need to mechanise the process of drawing. Admittedly there are dedicated programs which can do this but they take time to learn, so I set out to see if the job could be done effectively on a word processor. I was, in any case, unwilling to buy drawing software until we had some practical experience on which to base our choice. As it turned out, our 'drawing processor' took only a couple of hours to develop and is easy to use, providing tidy drawings which are easy to modify.

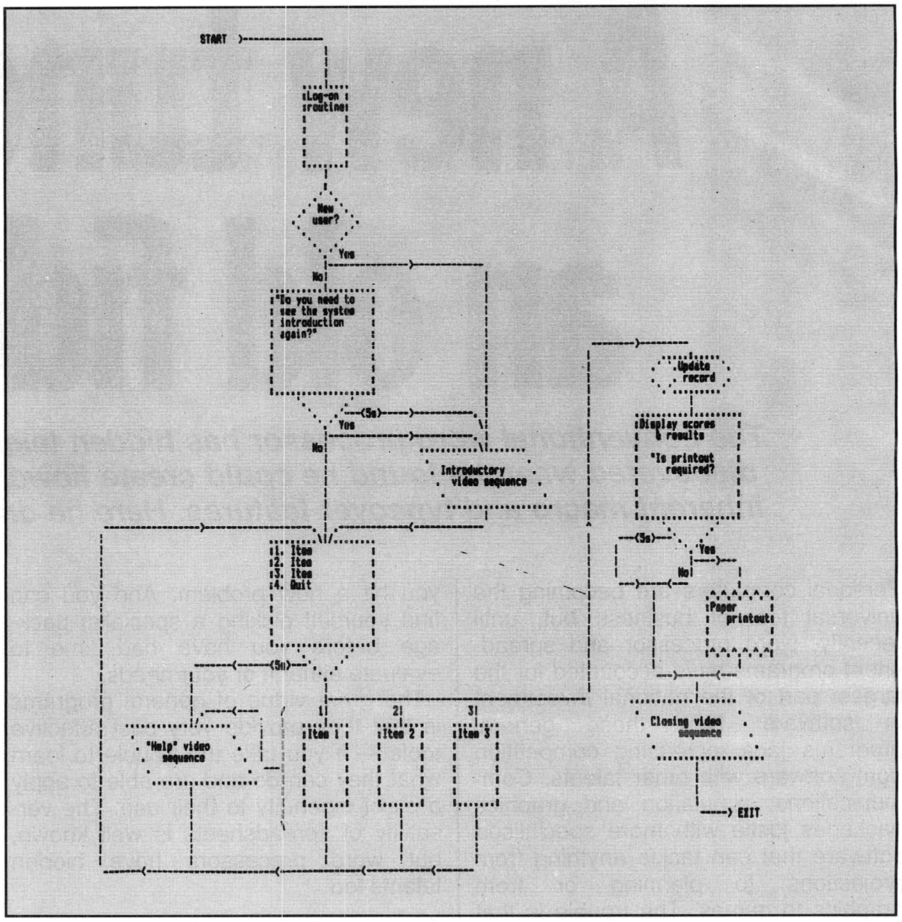
My office uses two word processor programs: Word Perfect and the multi-purpose package, Framework II. Each provides two features which, together, represent a minimum requirement for flowchart work — 'macros' and a 'typeover' feature. An advantage of these word processors is that they print more or less what they show onscreen. There is no reason why any word processor should not perform successfully with flowcharts if it has these fundamental attributes.

To avoid the need for graphics programming, the text character set which is routinely available on our printers (ASCII characters 32 to 126) forms the basis of the symbols. Along with an alphabet, this set includes punctuation marks and some particularly useful non-alphabetical characters. Patterns made from the characters, : . | ' ' < >^ \ /, form the flowchart symbols but you could construct them entirely from letters of the alphabet if you had to.

Drawing

It turned out that we already knew the basic word processor trick that would make drawings easy. Like most offices we commonly fill forms — schedules, contracts, and so on — by typing over a prepared layout. The answer to the drawing problem is to work entirely in the optional typeover mode — that is, with the word processor set not to insert characters between others in the text, but to overwrite them at the position of the cursor.

The flowchart starts as a clean sheet filled entirely with lines of spaces, with each line terminated by a hard return. The size and number of lines on this sheet is set to occupy the entire page provided by the word processor format.



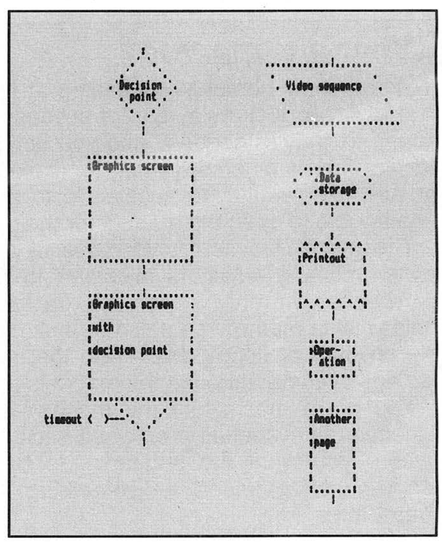
Macro symbols do not have to be purely textual: note how inverted comma symbols are used to fill diagonal lines on this flowchart

The common default layout of 66 lines of 80 spaces is a good starting point for an A4 page. But the format is totally a matter of what the printer and the word processor can be persuaded to do and it is better to set it to 88 lines of 132 spaces if appropriate control codes are available.

Of course, if you have access to a wide printer, the number of characters per line can be greater and the format of the drawing 'landscape' instead of 'portrait'. Constructing the clean flowchart sheet is time-consuming, so save the original and copy it each time it is needed for use.

To draw a flowchart, you manoeuvre the cursor around the screen over the field of invisible spaces and visible characters, using the normal controls. In typeover mode, any character or macro you type from the keyboard is laid down on the page in the chosen position without disrupting the existing layout.

Along with safety pins and Sellotape, macros are one of the seven great wonders of the world. They allow a single key-press to release a torrent of



Flowchart symbol macro

pre-recorded characters and commands. Their precise operation varies from package to package, but no word processor which lacks macros should be taken seriously. Each flowchart symbol is made up of a long string of

Box macro listing

```
{DNARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}   ..........:.........   {DNARROW}   {LEFTARROW}   :
{DNARROW}   {LEFTARROW}   :   {DNARROW}   {LEFTARROW}   :   {DNARROW}
{LEFTARROW} :   {DNARROW}   {LEFTARROW} :   {DNARROW}   {LEFTARROW} :
{DNARROW}   {LEFTARROW}   :   {DNARROW}   {LEFTARROW}   :   {DNARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
:................:   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {UPARROW}   :   {UPARROW}   {LEFTARROW}   :
{UPARROW}   {LEFTARROW}   :   {UPARROW}   {LEFTARROW}   :   {UPARROW}
{LEFTARROW} :   {UPARROW}   {LEFTARROW} :   {UPARROW}   {LEFTARROW} :
{UPARROW} {LEFTARROW}   :   {DNARROW} {DNARROW} {DNARROW} {DNARROW}
{DNARROW} {DNARROW} {DNARROW} {DNARROW} {RIGHTARROW} {RIGHTARROW}
{RIGHTARROW} {RIGHTARROW}   {RIGHTARROW} {RIGHTARROW} {RIGHTARROW}
{RIGHTARROW}   {RIGHTARROW}   {DNARROW}   |   {UPARROW}   {UPARROW}
{UPARROW}   {UPARROW}   {UPARROW}   {UPARROW}   {UPARROW}   {UPARROW}
{UPARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}
```

Graphics box with decision point macro

```
{CTRL-1}{CTRL-0}{LEFTARROW} {CTRL-1}{CTRL-0}. | {CTRL-1}{CTRL-0}.
{BACKSPACE}   {DNARROW}   {LEFTARROW}   :   {DNARROW}   {LEFTARROW}   :
{DNARROW}   {LEFTARROW}   :   {DNARROW}   {LEFTARROW}   :   {DNARROW}
{LEFTARROW} :   {DNARROW}   {LEFTARROW} :   {DNARROW}   {LEFTARROW} :
{DNARROW}   {LEFTARROW}   :   {DNARROW}   {LEFTARROW}   :
{CTRL-2}{CTRL-0}{LEFTARROW}   :   {CTRL-1}{CTRL-8}.   {DNARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW} {LEFTARROW} {LEFTARROW}   {LEFTARROW}   `. {RIGHTARROW}
{RIGHTARROW} {RIGHTARROW} {RIGHTARROW}   {RIGHTARROW} {RIGHTARROW}
{RIGHTARROW}   . '   {DNARROW} {LEFTARROW} {LEFTARROW} {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW} {LEFTARROW} {LEFTARROW}   <   {RIGHTARROW} {RIGHTARROW}
>---`.   {RIGHTARROW}   {RIGHTARROW}   {RIGHTARROW}   .'   {DNARROW}
{LEFTARROW} {LEFTARROW} {LEFTARROW}   {LEFTARROW}   {LEFTARROW} `.'
{UPARROW}   {UPARROW}   {UPARROW}   {UPARROW}   {DNARROW} {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW} :   {UPARROW}   {LEFTARROW} :   {UPARROW}   {LEFTARROW} :
{UPARROW}   {LEFTARROW}   :   {UPARROW}   {LEFTARROW}   :   {UPARROW}
{LEFTARROW} :   {UPARROW}   {LEFTARROW} :   {UPARROW}   {LEFTARROW} :
{UPARROW} {LEFTARROW} :   {DNARROW}   {DNARROW} {DNARROW} {DNARROW}
{DNARROW}   {DNARROW}   {DNARROW}   {DNARROW}   {DNARROW}   {DNARROW}
{DNARROW}   {DNARROW}   {RIGHTARROW}   {RIGHTARROW}   {RIGHTARROW}
{RIGHTARROW} {RIGHTARROW} {RIGHTARROW}   {RIGHTARROW} {RIGHTARROW}
{RIGHTARROW} | {UPARROW} {UPARROW}   {UPARROW} {UPARROW} {UPARROW}
{UPARROW}   {UPARROW}   {UPARROW}   {UPARROW}   {UPARROW}   {UPARROW}
{UPARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}   {LEFTARROW}
{LEFTARROW}
```

characters and cursor movement commands which form the appropriate pattern. You need to have a consistent policy about the starting and finishing points for each pattern; that way you will avoid endless frustration trying to get lines and symbols to link up neatly. For that reason it's quite a good idea to pre-plan your macros on squared paper.

Developing macros

The set of macros you develop to provide your flowchart symbols depends entirely on your need and is limited only by ingenuity. For example, the trick of using the two inverted comma symbols (' and ') to fill diagonal lines opens up many possibilities (examples are shown in the diagrams on the previous page). Don't forget to include a simple macro for drawing vertical lines — it is very time consuming to have to use the cursor controls to place identical characters vertically beneath each other. Something as simple as "|—down — left" is fine.

Repeated use of this macro rules a line down the screen. Another useful

The best pr

We offer you the opportunity to test our claims. The Computer House will better any price on any computer item from any other dealer.
Try us, you won't be disappointed.
Ring now on (03) 699 2000.

OUR GUARANTEE

We guarantee to find you the lowest prices in Australia. The lowest prices on a complete range of products backed by Australia-wide maintenance and service. Guaranteed Service. Guaranteed Savings. Guaranteed Satisfaction.

PRODUCTS OF THE MONTH

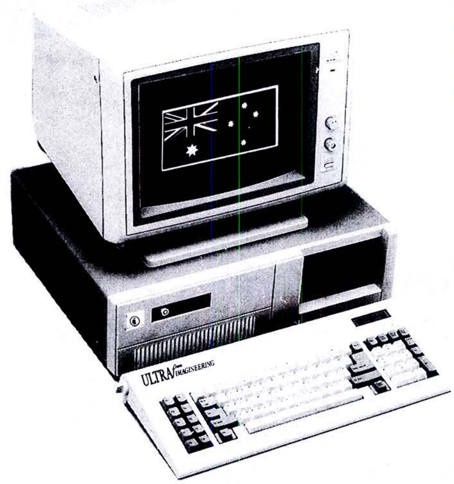
You'll be thankful you waited

From Imagineering comes a 640K computer called the ULTRA Turbo XT at a really imaginative price. Only **$1295** ex. tax at The Computer House... but that's only the beginning. The ULTRA Turbo XT is positively crammed with features, most computers call "extras".

Like:
* Two 360K disk drives.
* Parallel and serial ports.
* Clock/calender.
* Games port.
* Security keylock.
* GW Basic.

And not only is it a much more powerful computer now, it has the expansion facilities to cater for your future needs - nine expansion slots and 150w power supply.

It also comes with manuals, blank diskettes, even a cross section of good public domain software.



Then there's the AST Premium/286

Powerful, versatile and lightning fast, this system provides for exceptional versatility and upgradeability, yet it is IBM PC AT compatible.
It features:

* 1 Mbyte AST FASTRAM, expandable up to 2MB in a single slot, for conventional, extended, expanded and enhanced expanded memory.
* Advanced coprocessor socket accepts 8MHz 80287 devices.
* Enhanced low profile keyboard with separate cursor and numeric keypads plus extra function keys.
* User selectable operating speed at 10,8 and 6Mhz for the widest range of hardware and software capability.
* Runs popular IBM compatible software 50% faster than the IBM PC AT.
* AST-3G Plus multimode enhanced graphics adaptor with 256KB video RAM included. Supports IBM EGA, CGA, Hercules Graphics Card and IBM Monochrome Display Adaptor modes for flexible graphics and text display.

ALL THIS PLUS UNBEATABLE PRICING WITH SUPPORT FROM AUSTRALIA'S LEADING DISTRIBUTOR.

IMAGINEERING™
· PC DIVISION ·

IBM is the registered trademark of International Business Machines Corp.

SOFTWARE

	Excl. tax	Incl. tax
Spreadsheets		
Lotus 123 Rel. 2	$569	**$649**
Supercalc 4	$469	**$563**
Lotus HAL	Call	**Call**
Silk	$249	**$299**
V.P. Planner	$158	**$178**
MS Multiplan	$295	**$335**
Javelin	$599	**$689**
Database		
dBase III plus	$789	**$914**
Foxbase	$495	**$549**
Q & A	$448	**$498**
Paradox V1.1 I	$790	**$887**
R Base Systems	$1045	**$1191**
Reflex	$195	**$225**
Clipper compiler	$759	**$899**
Dataflex	$1095	**$1285**
Word Processing		
Multi Mate products	Call	**Call**
Wordstar	$319	**$374**
Wordperfect	$499	**$578**
Microsoft Word	$569	**$669**
Leading Edge	$249	**$295**
Integrated		
Framework II	$875	**$1045**
The Smart Series	$870	**$999**
Symphony	$895	**$959**
Ability	$235	**$285**
First Choice	$245	**$287**
Open Access	$860	**$999**
Graphics		
MS Chart	$398	**$479**
Harvard presentation graphics	$475	**$576**
Freelance	$485	**$549**
Freelance +	$619	**$729**
Utilities		
Sidekick (Unprotected)	$99	**$118**
Norton Utilities	$127	**$139**
Norton Utilities Advanced	$215	**$249**
Mace + Utilities	$119	**$135**
X-Tree	$ 89	**$ 98**
Fastback	$154	**$169**
Sideways	$ 78	**$ 99**
Microsoft Windows	$169	**$199**
Copywrite	$ 85	**$ 99**
Languages		
Microsoft C Compiler	$680	**$796**
Microsoft Macro Assemb.	$299	**$349**
Microsoft Quick Basic	$155	**$177**
Turbo Power Tools	$190	**$214**
Turbo Pascal (V 3.0)	$139	**$165**
Turbo Prolog	$138	**$154**
Accounting		
Satchel	$620	**$695**
Dollars and Sense	$229	**$259**
Sybiz Book Worker	$799	**$892**
Accounting 1	$775	**$845**
T*A*O* Specialised accounting for accountants		**Call**
Also Sybiz, I.A.L., Integrity, etc.		**Call**
Communications		
Crosstalk	$174	**$197**
Reflection (H.P. Emulation)	Call	**Call**
Entertainment		
Silent Service		**$ 95**
Zork I, II or III		**$ 84**
H/Hikers Guide to the Galaxy		**$ 77**

ces in town

	Excl. tax	Incl. tax
Karateka		$ 84
Flight simulator		Call
and many many more		Call
Project Management		
Harvard Project Management	$546	$657
Super Project plus	$569	$669
Microsoft Project	$546	$657
Timeline	$599	$682

HARDWARE

	Excl. tax	Incl. tax
System Units		
AST Premium Series (10 MHZ)		
Inc. EGA & 20MB	$4749	$5399
Inc. EGA & 40MB (28MS)	$5479	$6479
Imagineering Ultra XT Turbo's Inc. 2 F'Drives, TTL Mono, DOS, 640KB Software, 10 Diskettes Etc.	$1699	$1999
For Other Configurations	Call	Call
Chendai laps	Call	Call
Super PC by Hyundai	Call	Call
Disk Drives		
Seagate 30Mb	$888	$995
Seagate 20Mb	$689	$799
bigger than 20Mb	Call	Call
Hardcard 20Mb	$1299	$1490
Hardcard 40Mb	Call	Call
Mountain Drivecard	Call	Call
Tape Backup		
Internal 40Mb from	$789	$899
M'Function & Memory Boards		
Hypertec Hyper - 512 MF	$349	$398
Hypertec Hyper - 512	$245	$269
Hypertec Hyper - 256	$178	$185
Hypertec Hyper - 128 AT	$249	$299
Hyperam AT & XT	Call	Call
Intel Above Boards	Call	Call
AST Ram page PC	Call	Call
Display Cards		
Hypertec E.G.A.	Call	Call
Paradise Autoswitch E.G.A.	$557	$639
Hercules Graphics Card plus	$408	$475
Vega deluxe	Call	Call

	Excl. tax	Incl. tax
Turbo Cards		
Hyper Ace 286 (6Mhz)	$649	$699
Hyper Ace 286 Plus (10 Mhz)	$699	$799
and many others	Call	Call
Monitors		
E.G.A. from	$820	$995
Mono from	$170	$199
Colour from	$495	$545
NEC Multisync	$1199	$1399
Modems		
Netcomm 2123	$399	$449
Netcomm 123A	$759	$899
Le Modem	$349	$419
Complete Netcomm Range	Call	Call
Data Bridge Range	Call	Call
Printers		
Epson EX 1000	$899	$1059
Epson LQ 1000	$966	$1149
Epson FX-1000	$755	$885
Epson LX 86	$399	$459
Fujitsu DL 2400	$1654	$1895
Seikosha (400 cps)	$2439	$2790
Brother	Call	Call
Laserjets from	$3790	$4490
Other Boards and Peripherals		
MS Mouse (Bus or Serial)	$229	$269
Power Supplies	$179	$199
Plotters (H.P. or Roland)	Call	Call
Cables	Call	Call
Acoustic Hoods	Call	Call
Printer Buffers	Call	Call
Power filters	Call	Call
Coprocessors	Call	Call
Summa graphics bit pads	Call	Call

REMEMBER

THIS IS ONLY A SAMPLE OF OUR PRODUCT RANGE – CALL NOW FOR THE PRODUCTS OF YOUR CHOICE.

EXTRA SPECIALS

Lotus 123

Still the world's No. 1 selling software package.

$649 inc. tax

Epson

Complete range at super special prices.

CALL

FOXBASE+

6.69 times faster than dBCOMPLIER and 2.26 times faster than Clipper. Totally compatible with dBase III and you need make no changes to your present programmes, databses, screens or reports

$595 inc. tax

Hyperace 286 Plus

The outstanding turbo card from Hypertec runs a 80286 processor at 10MHZ effectively turning your XT into a superior AT. Australian designed and produced their is no better card on the market.

$799 inc. tax

THE SMART SERIES

Ver. 3.1. For the very best in integrated software with super new features.

CALL

PLUS

• Free Hotline Service • Immediate* replacement of any defective stock • Training arranged • Expert advice • Australia-wide maintenance

DELIVERY

• Anywhere in Australia for $7.50 (under 3 kg) • Overnight on request • Goods over 3 kg are charged at Post Office rates • Prices are subject to change without notice • Terms: Payment on receipt of goods • Bankcard, Mastercard, Visa accepted

"We rent PC's, call now for information"

*Subject to availability

The Computer House

Phone Now (03) 699 2000

161 Park Street, South Melbourne, VIC. 3205 Telex: 34145

"We rent PCs, call now for information"

Sextant/186.

Now—a PC for the price of a decent lunch

As even the most dedicated gourmet will confirm, the size of the bill is often in inverse proportion to the quality of the fare.

And while disappointment is the more frequent result, occasionally, one can be surprised and delighted for peanuts. This phenomenon also occurs in the world of technology, the Super 16 PC being the perfect example. When first served in the US, it became the fifth most popular PC in under 12 months.

Made by Hyundai and supported by SNS with a 12 month warranty, the Super 16 comes with 512K RAM, Hercules compatible graphics, MS DOS 3.2, GW Basic and WordStar Easy. And the menu is varied with a 30Mb hard disk stand-alone and a Turbo version, switchable to 8MHz. But the most pleasant surprise comes with the bill. Including high resolution monitor, twin floppy and tax, you can enjoy the Super 16 for just $1,995.

Which is about what you'd pay for lunch for four at Eugenie-Les-Baines (including wines and car hire ex Paris). However, while the pleasure of lunch at Eugenie-Les-Baines may tempt you to stay for dinner, the Super 16 will keep you totally satisfied for years.

SUPER 16

Level 8, 8 West Street, North Sydney, NSW 2060
Telephone (02) 957 6564 Fax (02) 929 4242 Telex AA75834
3A/1 Pirie St, Fyshwick, ACT 2609 Phone (062) 80 7542

YOU CAN RELY ON HYUNDAI

SNS3847

one erases chunks of the drawing by overtyping them with a line of spaces — perhaps "5 spaces — down — 5 left". If you wish you can extend this eraser macro to take in the entire space of the smallest symbol; or even, if you feel it worth the work, make an 'anti-symbol' to go with each symbol which can knock it cleanly off the screen in one go. Don't be tempted to overdo the macro library, though. For speedy and confident work you need to remember them all.

Drawing quality is greatly enhanced by using the 'condensed' mode of the printer, which allows something like 132 characters instead of 80 across a standard A4 sheet. In most cases you can select this mode directly from the word processor options; or sometimes by sending control codes to the printer. In many cases a further control code will allow you to reduce the vertical spacing of the printer lines.

Caution

No one pretends that our flowchart processor is ideal for its purpose and a note of caution is essential. Because a word processor is designed to deal with text, it can sometimes work against the interests of drawing and there are a few actions that can produce instant chaos. To avoid them it is important to understand the fundamental distinction between the two kinds of document. Text layout is not much concerned with vertical relationships on the page. The machine feels free to shuffle characters around without concern for what comes immediately underneath what — unless you are dealing with margin or column edges. There is little underlying structure to a page of text other than the order of the words.

A drawing, on the other hand, takes place on a pre-existing 'canvas' — the screenful of spaces with which you start. Preserving that structure is a first priority, so the worst thing you can do is to make a careless insertion of a return character. Returns are wholly redundant in flowchart drawing because they instantly destroy the vertical relationship of characters. If your word processor allows the re-designation of keys, it is wise to eliminate this possibility by disabling the Return key or replacing it with a 'cursor down — start of line' command.

Another common mistake is to place a large macro so near the edge of the page that the word processor thinks it must 'wrap words' at the end of the line. You can dodge this particular problem if your word processor provides 'hard spaces' (these are the kind that don't break lines during word-wrap).

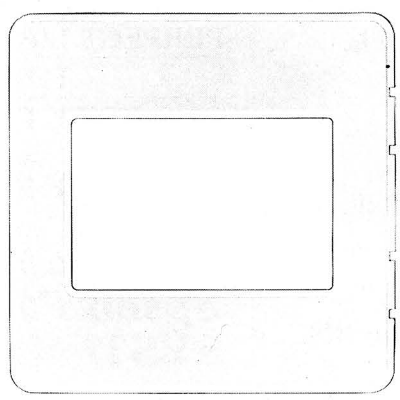
In practice none of this needs to be a problem because once the flowchart macros are set up, you find that you use them in a way quite different from normal word processing — a whole new set of habits develops to take care of your work. Above all, very frequent saving to disk allows you to undo any really catastrophic consequences of error.

Conclusion

In spite of its obvious limitations, so successful has been this application of our word processors that it has passed into regular use without any real trouble. It has provided legible, clean, functional drawings which can be copied for all our team members to use and understand.

Most important, it has bought us the time to make a considered choice of a tailored drawing package which will take in all our special needs. In that way it has fulfilled perfectly one essential buyer's dictum — one which is so often defeated by the rapid comings and goings of the software market: *don't buy until you are absolutely certain what you need.*

END



"Your slides should be ready sometime tomorrow."

With Polaroid instant films and imaging equipment, you can develop professional presentations in-house, in minutes.

Slides the way you want them. Where you want them. When you want them. Instantly.

That's what you get with the Polaroid 35mm Instant Slide System.

Record what you do. Or what you see. And then present it in minutes. No waiting. No surprises. No outside help. There's simply no faster, more efficient way to develop a presentation.

Shoot with Polaroid PolaPan for perfect continuous tone images. And with PolaGraph for high contrast black and white slides, or with Polaroid PolaChrome and High Contrast PolaChrome for rich, accurate color slides.

Even new PolaBlue for instant white-on-blue word or graphic slides. Then simply process and mount for professional quality slides in minutes, not hours or days.

In fact, no matter what material you need to present, we have all the sizes and formats you'll need – from 35mm color or black and white slides to 8″ × 10″color overhead transparencies.

What's more, we have a full range of easy-to-use, instant imaging systems. We have devices

"Your slides will be ready in fifteen minutes."

that can process 35mm slides without a darkroom, or make 8″ × 10″ color prints and overheads from 35mm slides.

We also have electronic imaging systems that give you instant prints or slides from a personal computer.

Better still, you can handle everything in-house, with complete confidentiality.

What are you waiting for? Get instant images whenever you need them. From Polaroid.

For more information call the Polaroid Hotline toll free (008) 22 6785 or 887 2333 for Sydney metropolitan areas.

Polaroid

Polaroid is a registered trademark of Polaroid Corporation, Cambridge, Mass., U.S.A.

For more information, mail this coupon to Polaroid Australia Pty Ltd. Eden Park Estate, 31 Waterloo Road, North Ryde, N.S.W. 2113.

Please send me information about:

- ☐ Instant 35mm Slides
- ☐ Instant Overhead Transparencies
- ☐ Instant Photographic Systems
- ☐ Computer Image Recorders

Name:__________

Company:__________

Address:__________

__________ Postcode:__________

Telephone:__________ Ogilvy MPE 0023

Now for the details . . .

MASTER CONTROL MODULE

Enable's Master Control Module provides the integrated environment for the five applications.
• Simple install and startup procedure • Install video drivers specific to hardware • High level language interface • Up to 8 windows which can be sized, shaped, overlapped or zoomed to full screen • Data transfer among applications with only a few keystrokes • Print queue manipulation • Comprehensive macro programming capability • Window to DOS • Built in menu generator • Context sensitive help messages • Automated scrolling in Word Processing, Spreadsheet and DBMS.

WORD PROCESSING

Enable's Word Processing module gives you the full functionality of a dedicated word processor, including
• Ability to define default ruler setting • Comprehensive editing and inserting • User adjustable margin and tab settings in multiple rulers in the one document • Block copy and move • Automatic footnoting • Search and replace through entire document, forward and backward, with "wild card" masking and case optional • Fast draft mode, final "what you see is what you get" mode • Text attributes like boldface, italics, and underline • Subscript and superscript • Mail merge • Automatic indexing and tables of contents • Multiple character sets including foreign, Greek and special characters • Automatic reformatting as text is deleted, inserted, moved, or new margins are established • Half or full page vertical scrolling • Character transpose command • Proportional spacing • Use of menus or expert commands and function keys for users with various levels of expertise • Import/export MultiMate, WordStar, EasyWriter I, VolksWriter, DCA, DIF, and ASCII files • Multiple column copy and move • Alternating headers and footers • Spelling Checker with 80,000+ word dictionary • Newspaper type columns • Conditional page breaks • User defined shorthand • "Go to page" expert command • Numbered page breaks • Columnar calculator and full function statistical, scientific and financial calculator • Text conversion from upper to lower case and vice versa • Outline assist • Soft hypenation • Hard space.

SPREADSHEET

Enable's Spreadsheet performs every "what if?" function you need and does so with startling speed.
• Ability to protect all spreadsheet cells • Standard financial, scientific and statistical functions • Import/export Lotus 123, Lotus 123 Version 2, Symphony, SuperCalc 3 and ASCII files • Automatic conversion of Lotus macros • Import Multiplan SYLK files • User configurable spreadsheet dimensioning, with 6 options up to a maximum of 65,025 cells • Highlighting of related cells to immediately show the impact a change will make • Variable column length to accommodate loading of DBMS data • "Step" feature to manually or automatically change the value of a cell to reach a specified target • Combine multiple spreadsheets into one • Apply attributes to labels • Copy current result of formula explicitly • Takes advantage of an 8087 math coprocessor, if available • Split windowing (either horizontal or vertical) to display two different segments of a spreadsheet simultaneously • Automatic reprinting of column and row borders when spreadsheets print more than one page of output • Row/Column sort (primary and secondary) • Hidden columns • Transpose rows and columns • Simultaneous display and updating of spreadsheet and associated graph.

DATABASE MANAGEMENT

Enable's DBMS provides sophisticated, flexible and easy to use data entry, file management, information retrieval and report generation.
• Import/export dBase III, PCFile III, Condor 3 and ASCII files • Export files as fixed field or comma separated ASCII • Menu driven field definition • Separate input form macros for ADD and EDIT • Comprehensive "paint the screen" input and report form design • Full screen data entry with extensive and automatic field editing and validation • "Virtual" fields (computed or copied) eliminate data redundancy among files • Automatic updating/editing of linked fields across all related databases • Automatic duplication of data from one record to subsequent records if desired • Default data on input forms • Over 65,000 records per file with up to 254 fields per record • Data may be entered from the keyboard, copied from other files, computed or supplied by the operating system. Update multiple databases from a single input form • Local fields on input forms • Retrieval of records by the contents of any field including both textual and numeric data (Query by example) • Rapid search and retrieval using Boolean logic, arithmetic and relational operators, and "wild cards" • VERIFY, COPY, UPDATE and MERGE commands for record maintenance • Access records in ascending or descending index order • Sort all or selected records in a database on up to 8 fields • Sophisticated report generation using either the menu driven method or the powerful command language • Comprehensive Procedural Language commands including PERFORM, WHILE, GOSUB • Reports may include fields from multiple databases • Interwindow copying from spreadsheet or word processing to database • Print database definition • Automatic rebuilding of database records and indexes if database definition is revised • Ability to pass field contents from user defined menus to database files, macros and procedural language programs.

GRAPHICS

Enable's Graphics automatically produces high resolution black and white or colour graphs, depending on graphics card resolution and monitor type, including EGA full colour support.
• Create graphs from either spreadsheet or DBMS • Size, shape and position graphs using windows • 12 graph types: 2D and 3D vertical bar (set or group), 2D and 3D vertical stacked bar, pie, exploded pie, line, symbol, xy, and open/high/low/close • History of previously defined graphs • 9 different fonts • User controlled size of titles, labels, and legends • 10 different colours • Up to 3 titles, 3 subtitles, labels and legends • Move graphs into Word Processing file • Landscape/Portrait mode for output to printer • User defined Y axis scale • User specified symbols in line and xy graphs • Simultaneous update and display of linked spreadsheet and graph.
And now with Perspective ™ 3D graphics. (See overpage)

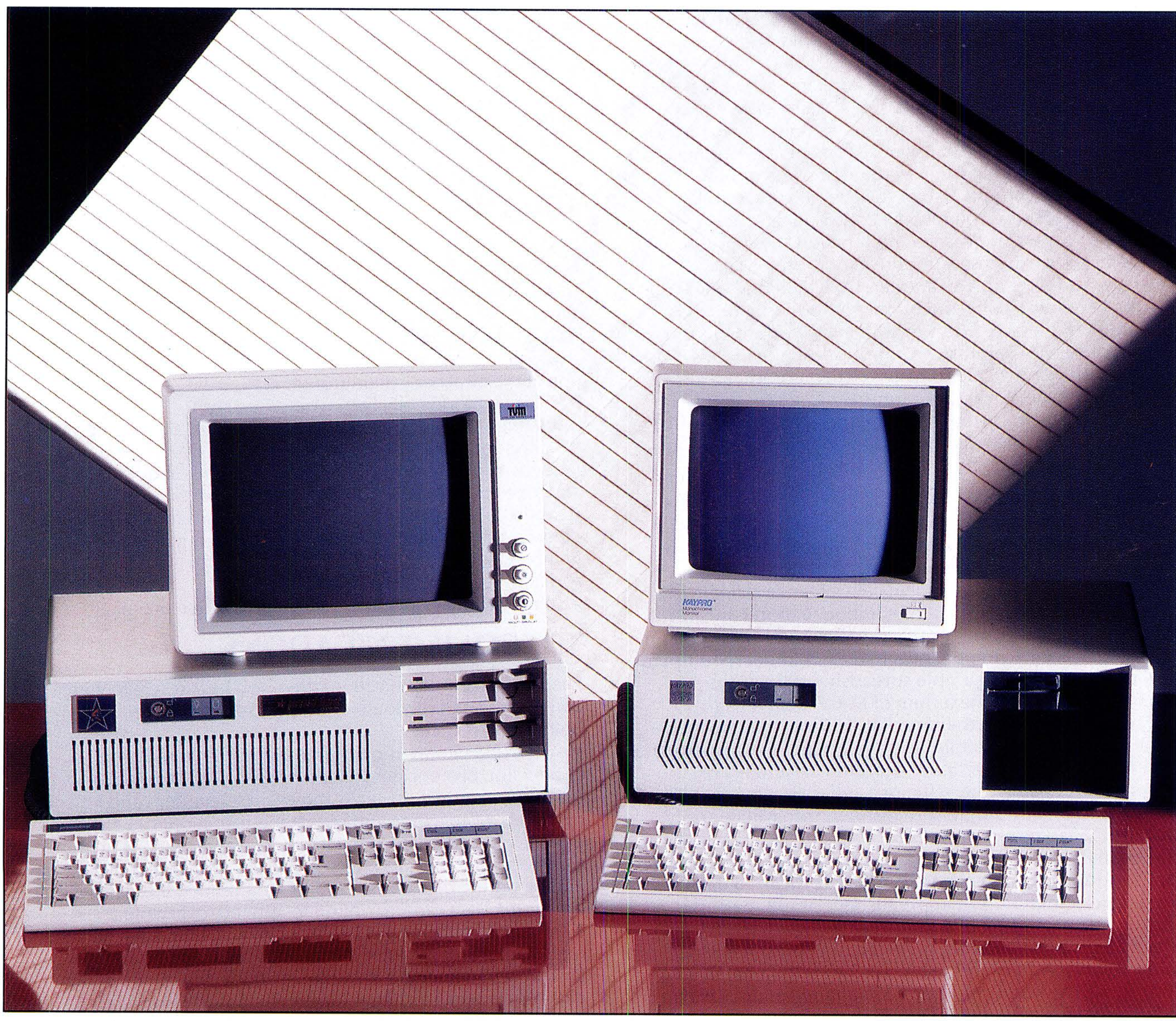
TELECOMMUNICATIONS

Enable's Telecommunications gives you easy access to your company's large computer, other personal computers or online data services.
• Automatic signon using stored "Setups" • Enter your connection protocol just once and then press a few keys to make that connection again and again • Xmodem and Kermit protocols • Pausetime and persistent dialing options • Auto signon using alternate Setup if first try unsuccessful • "Quick Connect" for infrequently used systems • Fullscreen data editing during data transmission • Unattended file transfer function • Data capture option to append/overwrite • Terminal emulation (VT100, VT52, AT & T 4410) • Asynchronous • Interrupt driven • 110 to 19200 baud • Special Hayes Smartmodem interface • Automatic buffering of incoming data • True break facility • Support for autodial modems • User specified keyboard mapping.

BENCHTEST

President Pacer 386 v Kaypro 386

The expected wave of '386 machines is starting to appear. Kester Cranswick examines two such machines: the Australian-built Pacer and the Kaypro 386.



It was a case of hitting the hardware nail right on the head. When Compaq announced its Deskpro 386, the first desktop PC to be built around the Intel 80386 chip, it caught the attention of journalists and power users alike. It was the right machine for the times, breaking the limits of previous PCs and promising unparalleled power.

Compatible makers had, until then, always followed in IBM's footsteps. Now here was a new leader, and a new machine. "If Compaq can sell them, so can we," they argued. Now the fruits of their labours are reaching the marketplace and there is a growing number of Compaq compatibles.

Others have sat back, waiting for IBM to play its 80386 card. Now that it has, those that followed Compaq find they have two targets to aim at. Which will dominate in 12 months time will depend on the market. The new 80386 architecture is still in its infancy. However, there is no doubt it is the way of the future.

What does a 80386 chip mean to a personal computer user? The answer to that is quite simple — more power and more speed. The 16-bit 80286 chip was no slouch of course, able to address 16Mbytes of RAM and one gigabyte of virtual memory, on disk or tape. Coupled with MS-DOS 3.1, or later releases, it has been at the heart of AT technology for some years.

With a 32-bit 80386 CPU, a desktop PC can now address up to 4Gbytes of RAM, and 64Tbytes, or 6,400,000Mbytes of disk storage. The clock speed of the 80386 is 16MHz, the same as the best ATs can achieve, but considerably faster than many ATs.

There is one big handicap to 80386 architecture though — the operating system. It will quite happily run MS-DOS 3.X, the same as an 80286 machine. That brings no functional advantage other than in the memory department. It will also run Xenix, but the 80286 could do that.

What Intel's new CPU opens up is the possibility to run genuine multi-tasking applications, in a multi-user environment. Previous 286 machines can do that, although with severe limitations. But, for that to happen, a new operating system is needed.

Microsoft and IBM have announced what will probably become the de facto standard 80386 operating system. Analysts expected it to be called MS-DOS 5.0, but it came out as Operating System/2. However, it has only been announced, Delivery won't be for many months.

Compare the keyboards. . .

There are other rivals for the 80386 operating system crown, chiefly emanating from the US. Xenix has been mentioned. It is a derivative of Unix, and a pretty strong contender. Concurrent DOS, from Digital Research, is another possibility, and there are several other lesser known possibles to be considered, such as the just released MOS. So, any consideration of the relative merits of 80386 machines must be prefaced by the fact that the operating system to make them perform to their full capacity is still far from being decided, and there are two types of machine to choose from. The problem with the Compaq architecture is that it differs significantly from IBM's offering. IBM has come up with a 32-bit bus called the Microchannel. Compaq machines have their own 32-bit address bus, the two are incompatible, and OS/2 is designed for IBM machines. So, if OS/2 becomes the dominant operating system, Compaq and its clones may be left out in the cold.

Nevertheless, for those who can't wait a few months to see how good the IBM Model 80 is, there is the Compaq and its clones. As with all clones, they offer similar specifications, and better value.

The two 80386 machines chosen for this review are the US assembled Kaypro 386 Model E, and the Australian assembled President Pacer. Both have price advantages over the Compaq, offering the latest technology at a more affordable price.

. . . and spot the difference if you can

Kaypro is well known internationally in the compatible field. It made its mark with a series of luggable machines. Now its products cover the entire PC range, and have achieved a good reputation.

President is as Australian as the meat pie. From its factory in Queensland, the company has matched the PC models blow for blow, with attractive pricing and plenty of extras. The President range runs from laptops to 80386, with a major emphasis on desktop publishing hardware.

Hardware

Both PCs were supplied in ready to run form, with the vendor's choice of monitor. The President came with a Taiwanese made EGA colour monitor, the Kaypro's monitor was an own branded monochrome affair, made in Korea. With both PCs, a monitor is an optional extra, and not included in the price.

Th Kaypr wa als supplie wit GWBasic an tw application — Quarterdec Expande Memor Manager an Speedstor Ta inclusiv price ar $10,96 fo th President $12,59 fo th Kaypro.

Unpacke an se up ther wa littl visua differenc betwee eithe of these state of the art PCs, and the rest of the crop of compatibles. Apart from the product names emblazoned on the front, and only the Kaypro had the magic number 386 anywhere to be seen, they looked like any other PC you have ever seen.

In fact, the two review machines were all but identical. Both could have been assembled in the same factory, to all intents and purposes. Both had the same beige, metal casing. Both had exactly the same AT Expanded keyboards, right down to the same part numbers. Apart from the President having two floppy disk drives, different porting arrangements on the back and different grille cutouts on the front, they were very, very similar.

That is the problem with clones, and particularly in a new section of the market such as this. The makers have limited sources of the major components, such as the motherboard, and really all they can do is source cheaper power supplies, display cards and keyboards, put them together in a badged box, and take it to the market. When, and if, the 80386 Compaq market matures, there may be more options, but at this stage, it is difficult to assemble a significantly different machine.

Specifications varied considerably though. In the storage department, the Kaypro comes with a 40Mbyte hard disk, a single 1.2Mbyte floppy and 512k on-board RAM. It also has above board RAM, in the form of 2Mbytes on a 32-bit expansion card. I/O is one serial and one parallel port.

The President is considerably cheaper, and has 640k standard RAM, but has only 30Mbytes of hard disk and no above board RAM. It gains with an extra 1.2Mbyte floppy. It also has more I/O ports, with two parallel ports and one serial port on the back. As you'll find out later, it is basically an AT-clone with a 386 chip running it. That's a significant difference.

'The major internal difference between the two machines lies in which slots are used'

When you buy a 386 PC, make sure you get a bigger desk. The footprint of both processor boxes is 5cm1 x 42cm, and they stand 17cm high. Add to that a keyboard measuring 48.5cm x 21cm, and you have a monster of a PC to fit on your desk. Putting the processor box on the floor is strongly recommended.

The usual five screws hold the casing on. Undo those, and the innards are revealed.

What was suprising here was, again, the similarity of the two machines. What was not suprising was the dependence on Taiwanese parts.

The two motherboards were identical, even down to their country of origin. Both were American made Intel originals, and had exactly the same chipset, in exactly the same arrangement.

The square 80386 chip is big (it has 152 legs), fast and powerful. It sprints along at 16MHz and has a 32-bit address bus, really putting some pace into staid old applications. Even if no operating system is available to get into the multi-tasking and multi-user side, it has the speed to give power PC users a big step up. Look at the Benchmarks to see the difference an 80386 makes — it runs at twice the speed of most PCs.

Each machine has a vacancy for an 80387 maths co-processor, which is now available, if you need more number-crunching power. The motherboard sits along the base of the unit, running up underneath the hard disk, and holds less than 90 chips. Because RAM is stored on a separate board, the motherboard gets away with being quite small, taking up only half of the floorspace of the casing.

BIOS ROM for both machines is from Phoenix. The other chips are identical too. It is interesting to see where they hail from, Malaysia's chip manufacturers are obviously making a name for themselves, judging by the number of Malaysian chips on the motherboard. Other chips were from the Philippines, and even El Salvador. (I knew the Contras were fighting for something!)

Power supplies are similar in size and specifications. President's is a Taiwanese Skynet unit, and it has a fourpack of 1.5 volt AA-size batteries stuck to it to run the internal clock/calendar. Kaypro's unit is also Taiwanese, as if you couldn't guess. It's brand is Phihong Enterprise. A single lithium battery (adhered with Velcro to the back plate) provides power for the clock/calendar.

The question is, can these machines rightly claim to be American and Australian made. The Kaypro probably has the strongest claim, as the Intel boards do come from the US.

The President is assembled in Australia, but local content seems minimal. The distributor claims that assembly, burning-in, diagnostics and set-up account for 23 per cent of the price, and that local suppliers of things such as power supplies and cabling will be found in the future.

So, the President might make a claim for your patriotic dollar, but only if you appreciate that everything in the Pacer has been imported. That makes it a somewhat dubious claim. As for the Kaypro, it says it is made in the USA, but exactly the same reservations apply.

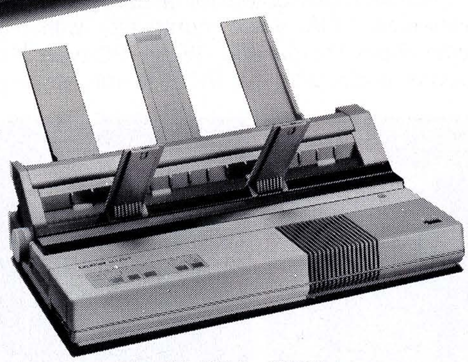
Each 80386 PC has two eight-bit, four 8/16-bit AT-type slots and two 32-bit slots, all full length. Thirty two bit slots are only found on 80386 machines, as they take advantage of the 32-bit address bus provided by the Intel processor. Note that the 32-bit slots will not take 16-bit or 8-bit cards. Also, only the bus to the 32-bit slots uses 32-bit addresses, so it is only if these slots are being used that there is a dramatic increase in data accessing speed. Use the 32-bit slot, as Kaypro has done, and you start to get some real advantage out of the 80386 architecture.

The major internal difference between the two machines lies in which slots are used.

In the Compaq 386 the system RAM is housed on an expansion board piggybacked off the motherboard. Both

How 'paper parking' and 24K buffer makes this printer faster than any other in its class.

Brother M-1709 $1,245 r.r.p.



Brother M-1509 $999 r.r.p.
Speed, looks and performance.
(Shown with optional extra, cut sheet feeder SF-40)

The Brother M-1709 is faster than all other printers in its price range. 240 cps in draft mode, 50 cps in Near Letter Quality — real NLQ.

But that's only part of the speed story.

Paper Parking

This remarkable Brother feature, eliminates all the time wasting that would normally occur when you change between fanfold and cut sheet paper (even with the optional cut sheet feeder). You just 'park' one while you use the other. Think of the time you save!

24K Buffer

Brother's 24K bytes buffer memory means even more time saving. It holds the equivalent of abou‌t ten pages of typing, so, for most applications, you can still use your computer while the printer goes about its business.

Plus quiet operation, auto paper loader, graphics capability, IBM and Epson compatability, front panel font and function selection, dual interfaces (Centronics and RS-232C).

The Brother M-1709 has every feature you've ever wanted in an office printer. Including speed.

For trade enquiries, a demonstration or further information, call Brother or post the coupon.

To: Brother Industries (Aust.) Pty. Ltd.
P.O. Box 398, North Ryde, NSW, 2113.

YES, I would like a demonstration of the new Brother M-1709 printer.

Company________________

Address________________

____

________ Postcode________

Telephone________________

Contact Mr/Mrs/Ms/Miss________________

CSO 4543

brother

The Affordable Printers

Brother Industries (Aust.) Pty. Ltd.,
7-9 Khartoum Rd, North Ryde, NSW, 2113.
• Sydney: (02) 887 4344
• Melbourne: (03) 873 3655
• Brisbane: (07) 52 5257
• Adelaide: (08) 42 6373
• Perth: (09) 478 1955.

Kaypro and President have followed this lead. The difference is that Kaypro has used a 32-bit board, while President has gone for a standard 16-bit board.

Let's get the boring board out of the way first. The Planar has a 16-bit Multitech card, holding 640k of RAM chips, several banks of DIP switches, and two parallel outports, of the nine pin and 23-pin variety.

In essence, it is an AT board, using a 80386 processor. It runs at 16MHz, but that's about the only advantage. To break the 640k RAM barrier, you'll need to install 32-bit Intel memory boards, as in the Kaypro, or 16-bit, third party, above-board RAM cards, and get some software to handle the extra RAM. That costs extra dollars, and those who buy the President thinking it is a fully fledged 80386 PC will be disappointed. With the Kaypro, you have an 80386 PC that uses the 32-bit bus. The Kaypro's system card is in the 32-bit slot, and is an Intel card with 2.5Mbytes of RAM on board, made up of 64k and 256k chips. It is what makes an 80386 processor fly. There's a spare 32-bit slot, for another 2Mbytes RAM, if you need it too. If 1Mbyte RAM chips were used, up to 16Mbytes RAM could be accommodated. To handle all this RAM, an application called Quarterdeck Expanded Memory Manager is provided — more on that later.

One extended 16-bit slot in both PCs is taken up by a full length disk controller. Both makers use the same controller board, with slight differences in the componentry. The disk controller can handle four drives, so there is space for two more on the Kaypro, one more on the President.

Both the hard disk units are full-height devices. That of the Kaypro is an American made, 40Mbyte, Priam model, while President has gone for a 30Mbyte Seagate, made in Singapore.

In the floppy disk department, President uses two half-height 1.2Mbyte Teac units, from Japan, while Kaypro has a single 1.2Mbyte Toshiba drive. Extra drives can be fitted under those already installed. There is space for two half height, or one full height device in the Kaypro, and one half height device in the President.

The third slot is taken up by the video controller. In the Kaypro, it is a half length, eight-bit CGA card. The clever part of this card is its emulation mode. In monochrome, it can emulate a CGA display with different shades of green. So, even with a green monochrome monitor, you can get some of the benefits of colour.

The card is also Hercules monochrome display compatible, as well as driving CV monitors. The output is through a 9-pin D-type connector.

President has opted for a full length Hercules EGA video controller, with both 9-pin D-type and 25-pin PC-type output ports, and the BIOS to run applications using Hercules boards. That's a clear advantage over the Kaypro, as the EGA standard delivers more colours and better resolution. That said, you could fit any video controller to either machine, but we are dealing with the machines as you would buy them.

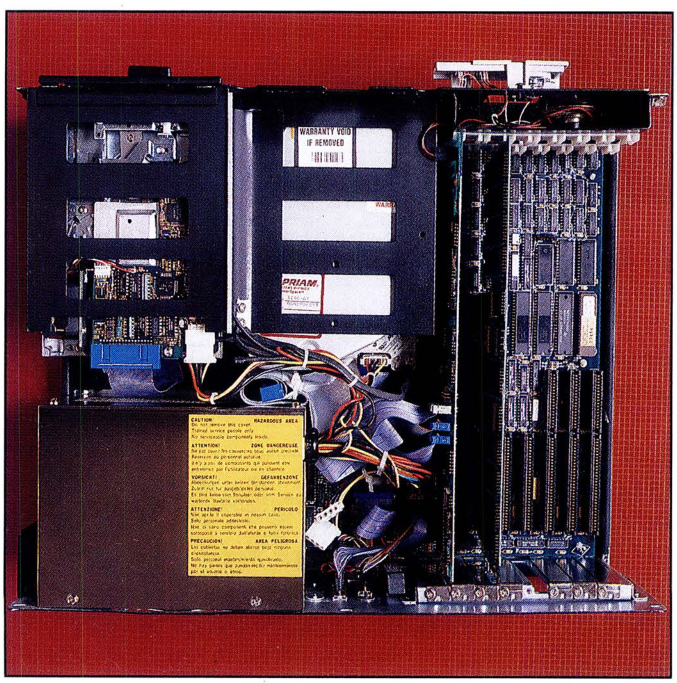
That leaves slightly different expansion potential on each machine. For future use, the Kaypro has one eight bit, three 16-bit and one 32-bit slot. The President leaves you with two eight bit, one 16-bit and both 32-bit slots open. Either way, there is plenty of room for growth.

The only other comment to be made on the internals of the two rivals is that the President has rather more ribbon cabling than is necessary. It makes the space between the drive controller and the drives very, very tangled. It would be nice to say that an Australian assembled PC set standards for the rest of the world.

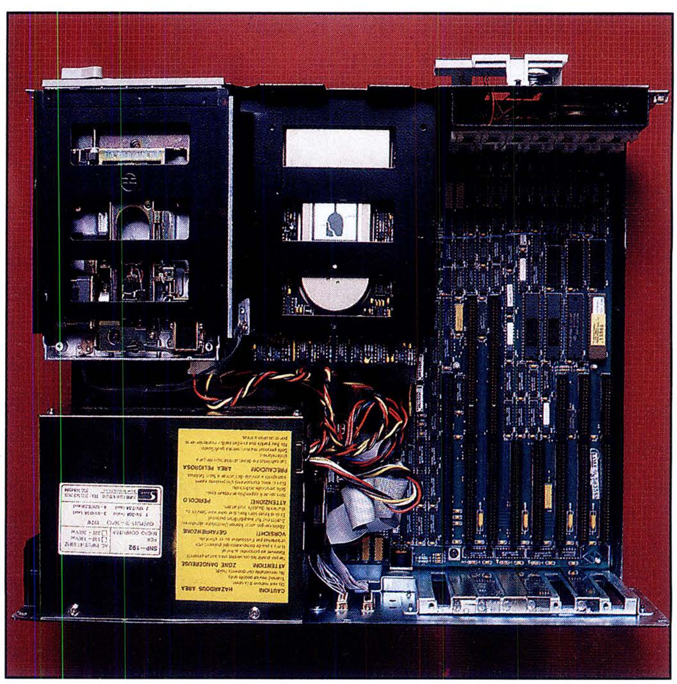
Keyboard

Both PCs under review come with the same keyboard. That of the President has a President badge in the top left corner, otherwise they are identical.

It is based on the IBM AT Extended keyboard, with 101 keys. This version has 102 keys, the additional key being marked SS/Macro, the function depending on whether it is shifted. No function is documented, though it could be con-

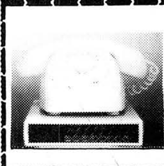


Kaypro uses a 32-bit bus

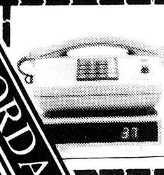


Visible is President's excessive ribbon cabling


The PC-AT Compatible
From WYSE Technology With:
286
Ultra-high Performance

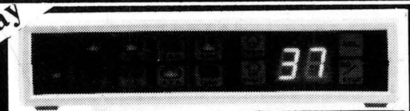


INTERLINK ELECTRONICS



AFFORDABLE MODEMS

Release May



A-24/24-x FEATURES:

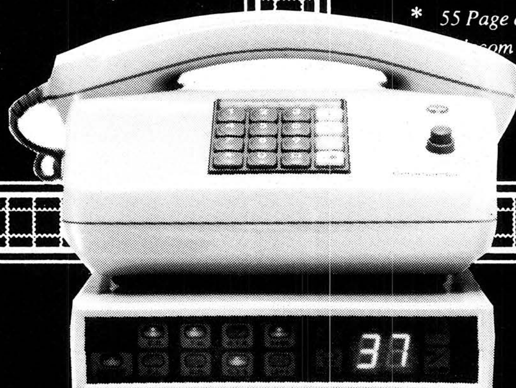
* *2400bps full duplex Sync./async.*
* *1200bps full duplex Sync./async*
* *1200/75bps & 75/1200 videotex standard, asynchronous.*
* *300bps full duplex Sync./async.*
* *Hayes compatible.*
* *Auto bauding & common port speed.*
* *Dial back security.*
* *Battery backed setup memory.*
* *LED status display & in-built speaker.*
* *Manual and Automatic operation modes.*
* *CCITT and BELL Standards.*
* *External, low profile design - RS-232 Interface.*
* *Videotex software included.*
* *Telecom Australia Approved.*

$995.00 inc. S.T.

A-12/12-x FEATURES:

* *1200bps full duplex asynchronous.*
* *1200/75bps videotex standard, asynchronous.*
* *300bps full duplex asynchronous.*
* *Hayes compatible.*
* *Auto dial/answer/disconnect.*
* *Tone and pulse dialling.*
* *CCITT and BELL Standards.*
* *FSK and PSK operation.*
* *Videotex software included.*
* *In-built dialling/call progress monitor.*
* *RS-232 Interface (EIA Standard).*
* *External low profile design.*
* *55 Page educational instruction manual.*
* *Telecom Australia Approved.*

$699.00 inc. S.T



M-12/75-X FEATURES:

* *1200/75bps Viatel / Videotex receive standard*
* *300bps full duplex.*
* *Manual operation.*
* *External low profile design.*
* *Asynchronous full & half duplex.*
* *Viatel software for IBM or Apple // included.*
* *Bell standard : 103.*
* *CCITT standards : V.21 & V.23 .*
* *FSK operation.*
* *RS-232 Interface (EIA Standard).*
* *Telecom Australia Approved.*

$329.00 inc. S.T.

A-12/75-x FEATURES :

* *1200/75bps videotex receive standard.*
* *300bps full duplex.*
* *Hayes compatible.*
* *Auto dial/answer/disconnect.*
* *Asynchronous full & half duplex.*
* *CCITT & BELL standards.*
* *Videotex software included.*
* *In-built dialling / call progress monitor.*
* *RS-232 Interface (EIA Standard).*
* *55 Page educational instruction manual.*
* *Telecom Australia Approved.*

$399.00 inc. S.T.

VICTORIA: A.C.D. — 76 St Kilda Road, ST KILDA — 537 1722 ● A.S.P. Computers — 19 Cummins Grove, MALVERN — 500 0628 ● Choice Systems — 123 Whitehorse Road, DEEPDENE, 3103 — 817 6132 ● Compak — 156 Martin Street, GARDENVALE — 596 7222 ● Computers 2000 — 14 Young Street, FRANKSTON — 008 781 4244 ● E.M.E — 215 Park Street, SOUTH MELBOURNE — 699 3088 ● Greensborough Computers — 67 Grimshaw St, GREENSBOROUGH — 434 6166 ● KCM Computers — 380 Victoria St, RICHMOND — 429 2733 ● Logic Shop — 1131 High St, ARMADALE ● Lasernet Computing — 248 St Kild Rd, ST KILDA — 534 0489 ● MicroBuff — 499 High St, MT WAVERLEY — 277 7754 ● Amicroe — 267 6072

SYDNEY: A.C.D. — 69 Oxford St, BOWOR JUNCTION — 389 4922 ● Eastern Micro Electronics — Gnd Fl, 88 Foveauk St, SURREY HILL — 212 6944 ● Insight Computer Services — 14 Edward Bennett Drive, WEST PENNABT HILLS — 634 2580

Designed & marketed by: INTERLINK electronics. 171 Dorcas Street, South Melbourne. Australia. 3205. Tel: 03 699-4177.

Due to continuing research and development specifications are subject to change without notice.

14-U-2-C

figured to do almost anything. Two fold down legs elevate the keyboard by some 15 degrees. That is common to almost all PC keyboards.

There are three LEDs on the keyboard, glowing if Num Lock, Caps Lock or Scroll Lock are toggled on. That and the rest of the keyboard are standard.

The 12 function keys are arrayed in blocks of four along the top of the keyboard. On the far left is the Esc key, while to the right of the function keys are Print Screen, Scroll Lock and Pause keys.

The numeric keypad is on the far right, and there is a T-block of cursor control keys between that and the alphanumeric section of the keyboard.

Above the cursor control keys are the insert, delete, home, end, page up and page down keys. That leaves a normal alphanumeric section, with large Enter key, two Alt and shift keys.

One complaint about both keyboards is the sharp edge on the space bar. Trained typists who used it said that the sharp edge started to give blisters on the side of their thumbs. Apart from its size, it is a fair example of what a PC keyboard should be like.

One curious omission, given the facilities that are usually crammed onto PC compatibles, is a reset switch. These are almost standard on clones. Someone must have slipped up here.

Still, both machines come with an AT-style keyboard lock, and a hard disk light that glows red when the hard disk is being accessed. Next to that is a green power on light. Both keyboard lock and power lights are, need I say it, identical.

System software

Each supplier has seen fit to include DOS 3.2 as the operating system. There is no attempt to provide a mutli-user, multi-tasking operating system that will utilise the 80386 chip to its full extent. That will have to wait until a suitable operating system is made available.

DOS 3.2 is not the latest version of DOS, IBM and Microsoft unveiled DOS 3.3 in April. It would be expecting too much for compatible manufacturers to be shipping 3.3 by now, but it will come quite soon.

The processor in these machines runs at either 8MHz (for speed sensitive applications) or 16MHz. Toggling between the two speed is a matter of pressing CTRL, ALT and either '1' or '2' on the numeric keypad. A beep is emitted, high or low in pitch, depending on whether the fast or slow speed is set.

Both machines announce themselves with Phoenix 80386 ROM BIOS, Version 3.03. The President pre-announces this by declaring it has EGA BIOS V1.1 installed.

When it comes to DOS, we have a difference. Kaypro has bought the rights to MS-DOS 3.21, and supplies it on two disks, with full documentation.

It contains all the DOS commands you'd expect, having GWBasic instead of Basic. Additional commands include HEXDUMP, SELECT, EXE2BIN, FC (a file comparison utility), and LINK, a utility to link object files into an executable program. There is also SETUP, a system configuration utility to tell the drive card what disk drives are installed.

On the DOS diskettes, there are a number of other utilities, all of some use.

CHATTR is for resetting the attributes of files, such as read-only, hidden, system and archive. A help facility for the utility is implemented.

D is like DIR, except that it lists files in alphabetical order, with their size. KCOPY is an extension of COPY that will copy files and directories, exactly as they are on an original disk. It also lists files that are about to be copied, and allows the user to select files individually, by type, by pattern and so on. Files can even be copied over modem. KCOPY is far, far more usable than COPY.

LOCATE is another useful utility, and its function is finding files. Complete with a help facility, it makes looking after a hard disk directory a breeze.

Video utilities are provided by Kaypro too. One utility lets you configure the graphics card to function in one of eight modes. Another utility, RAM-resident, lets you switch from colour to mono display with a single keystroke. All in, Kaypro has put

Kaypro 386 Model E:Technical specifications

Processor:	Intel 80386, 8/16MHz; socket for 80387 maths co-processor
RAM:	2.5MBytes, expandable to 16MBytes in two slots
ROM:	64k
Mass storage:	Half-height 1.2MByte 5 1/4in floppy drive, full-height 40MByte Winchester drive
Display:	any mono or CGA monitor
Keyboard:	IBM AT enhanced keyboard, 102 keys
Standard interfaces:	Centronics parallel port, 25-pin IBM PC connector; RS232 serial port, nine-pin D- type connector
Expansion slots:	Two 32-bit; four AT-style 8/16-bit; two 8-bit, three slots taken in 40MByte configuration
Operating systems:	MS-DOS 3.21
Software supplied:	GW-Basic, Quarterdeck Expanded Memory Manager, Speedstor

President Pacer:Technical specifications

Processor:	Intel 80386, 8/16MHz; socket for 80387 maths co-processor
RAM:	640k expandable to 16MBytes in two slots
ROM:	64k
Mass storage:	Two half-height 1.2MByte 5 1/4in floppy drives, full-height 30MByte Winchester drive
Display:	any mono or EGA monitor
Keyboard:	IBM AT enhanced keyboard, 102 keys
Standard interfaces:	Two centronics parallel ports, 25-pin IBM PC connectors; one RS232 serial port, 25-pin IBM PC connector
Expansion slots:	Two 32-bit; four AT-style 8/16-bit; two 8- bit; three slots taken in 30MByte configuration
Operating systems:	MS-DOS 3.2 from Laser Digit
Software supplied:	None

some thought into the DOS disks it supplies.

President has gone for DOS 3.2 too, but it comes from a company called Laser Digit. It is shipped with a Taiwanese copy of Microsoft documentation, enhanced to reflect the actual DOS, and is a curious beasty indeed.

For starters, most .COM files in Microsoft's DOS have been implemented as .EXE files. That means they are relocated to specific memory locations after loading, dictated by the file header. The commands work, of course and more efficiently, in machine terms. EXE files have only just come to DOS 3.3, so Laser Digit is right up with the times.

Some DOS 3.2 commands are missing. These include COMP, GRAFTABL and GRAPHICS. But, the Laser Digit DOS does have APPEND, to set a search path for data files. IBM has only just added this to its DOS 3.3.It also has a bunch of other commands. SETUP, LINK and FC are found, as on the Kaypro. PARK is useful. It parks the hard disk read head, so the processor can be moved. PREFOR is a command to format a hard disk, SPEED alters the CPU speed, so could be used in batch files, and a RAM disk can be set up in a .SYS file.

It all works as it should, and some of the extra commands are useful. There is no Basic with the President Pacer, but what you get is typical of the DOS supplied with many clones.

Applications software

President supplies no applications software with its Pacer. The dollars you save should leave you enough to buy exactly what you want.

The Kaypro has two applications, and the most important is the Quarterdeck Expanded Memory Manager (QEMM).

It enables the Kaypro to break the 640k DOS barrier, and, if you use it with something called DESQview, you get multi-tasking, and can run up to nine programs at the one time, according to the documentation. DESQview is not supplied though. It sounds like a sales pitch for that particular product.

The Intel 32-bit memory card uses 32-bit address buses, and picks up data in 32-bit blocks. That speeds up RAM access dramatically, providing the software can handle it. That's where QEMM comes in. It manipulates the 80386 memory map by mapping blocks of memory at run time. Physical blocks of memory are moved to different logical locations, with a few machine instructions, to speed up processing by pre-fetching data before it is needed, and storing it in the same RAM page as the calling instructions. It follows the Lotus-Intel-Microsoft Expanded Memory Specification.

QEMM is installed with a supplied installation utility and loads when you boot the machine. At installation, you specify the boot drive, and the amount of extended memory. Kaypro gives you an extra 2Mbyte RAM to play with. Some of this memory can be set aside for a RAM disk. You can also specify whether the expanded memory will be permanently available, or available only when needed by an application. You can also switch the expanded memory off at any time.

QEMM is also clever enough to set aside enough above board memory to bring normal RAM up to 640k, if 640k RAM is not installed.

That's all there is to the application. It sits there, minding its own business, until you have a 812k Lotus file you want to access. Then it swings into action, giving you all the RAM you need. It also speeds up RAM access a treat. I'd like to see it with DESQview though, to see the multi-tasking power of the 80386 unleashed.

The other application is a hard disk utility called Speedstor. It is for the installation and diagnosis of hard disk units, up to 160Mbytes.Using the install routines, you can create DOS partitions of greater than 32Mbytes, as well as up to eight DOS partitions. In that way, you can configure a hard disk as two or more drives.

Utilities allow you to check the health of any hard disk, and will give you a list of any bad tracks or sectors. These can be subsequently locked out of use. Drive controllers can be tested, drives re-configured to almost any specification, and partitions deleted or re-ordered — it is a beautiful utility if you want to make the most of your hard disk, and particularly useful if the 80386 is being used as a file server.

Using it is fairly simple, once you understand what it does. Menus are used to select operations, and with the manual, it is pretty self-explanatory. Every hard disk owner should have this utility.

Documentation

Here, the honours go to Kaypro. Supplied with the 386 is a users' guide, a guide to MS-DOS, a standard GWBasic manual, plus documentation for the two utility applications. The users' guide takes the novice through the keyboard, disk procedures, getting started in DOS and the various utilities on the MS-DOS diskettes. The other manuals are as clear as they usually are, meaning that if you have never used Basic, or MS-DOS, get a tutor!

President supplies a MS-DOS manual too, a Taiwanese copy of the Microsoft original. It also supplies a copy of an Intel guide to 80386 architecture. For the techies out there, it is a useful tome, with full details of what's what on the motherboard, I/O address maps, port configurations and how to configure the board. Most users won't get much out of the document though.

In use

Of the two review machines, the Kaypro is definitely the louder. The fan is loud enough to drive you to distraction. The President is far from being silent, but its noise is not so obtrusive.

The supplied monitors were hardly state of the art, and the least said about those, the better. Monitors are not included in the price, so the choice is up to you.

I ran both machines with a range of software, from WordStar to dBase III to Ventura Publisher. Their speed was appreciated, particularly for desktop publishing, and there were no compatability problems.

That's because both machines acted as 286 machines, as far as applications went. Apart from the extra memory that could be addressed by the Kaypro, it was just like using a super fast AT compatible. Only with an operating environment such as Xenix or DESQview will the 80386 PCs be able to run several applications at once. This can be done on a 286 machine, though if one application goes down, so does the whole machine. The new operating systems, such as OS/2, will remove this handicap.Without QEMM, the Kaypro did not like handling applications that needed more than 512k RAM. When QEMM was installed, it ran like a dream. The Kaypro's floppy disk also suffered problems, being unable to read files on the first 30k of a diskette. Copying a blank 30k file to this area solved that problem, but it was a dodgy solution. Kaypro engineers offered no explanation for the problem.

I also had problems with the President drive controller card. After it was removed and re-installed, it refused to recognise the hard disk. Only by returning the CPU to the manufacturer was this problem resolved. After that, it worked fine.

Prices

At $10,960, President has given its 80386 PC a definite price advantage, and it is perhaps the least expensive 80386 machine on the market today. However, it seems to be little more than a fast AT, as there is no 32-bit memory that can be accessed. For that, you'll need to spend money on an Intel board, and if you really want an

In perspective

The 80386 market is not crowded. That's because few users have figured out what to do with the technology. They make good file servers, if you equip them with networking cards and software. As a standalone, they are a status symbol, and the extra power is not worth the price.

IBM is also to be considered. If you are going 32-bit, wait a few months until we get a chance to evaluate the IBM Personal System/2 and OS/2, the promised operating system. It looks a more promising path than that embarked on by Compaq and Co.

Unless you are desperately convinced you need 32-bit, the safe bet is to stay with 16-bit machines. They are proven, can act as file servers, and are half the price of an 80386 machine.

32-bit technology may be where the future lies, but at this point in time, there are just a few too many questions about the directions it is taking to say that a 32-bit PC should be a priority purchase.

Benchmarks

President Pacer

BM1	0.17
BM2	0.87
BM3	1.61
BM4	1.67
BM5	1.80
BM6	3.04
BM7	4.71
BM8	5.13
Average	2.38

Kaypro 386 Model E

BM1	0.25
BM2	0.91
BM3	1.67
BM4	1.73
BM5	1.82
BM6	3.02
BM7	4.62
BM8	5.14
Average	2.40

80386, the President is stretching the term more than a little.

The Kaypro, at $12,195, is considerably cheaper than the 80386 pioneer, from Compaq, and with the utilities and extended RAM, seems to represent good value. However, both machines are still expensive, in comparison with the multitude of good ATs out there. Remember, too, that a monitor must be added to the price.

Conclusion

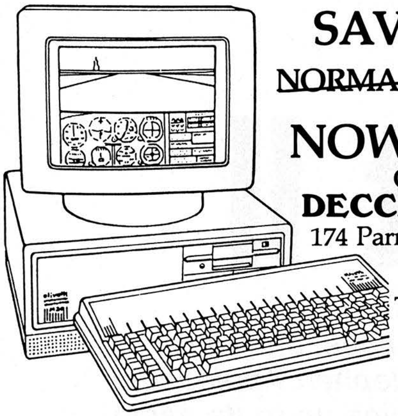
Time and time again, I came back to the similarity between these two 80386 machines. They look the same, have the same motherboard, the same keyboard, the same BIOS, and many components are the same. Where they differ is in the disk drive department, and in whether they have above board RAM fitted. The price difference would easily be made up if the President were fitted with a 2Mbyte RAM card.

If you are convinced you need an 80386 machine, you'll probably not be short of a bob or two. For that reason, I'd have to recommend the Kaypro. With its above board RAM, it comes closest to fulfilling the promises of the 80386 technology. It also has Basic and some useful applications supplied with it.

But, if you are a technophile, and want to get an 80386 for its improved speed, or to have the first on the block, then the President is a cheaper way to go about it. It is not a Compaq clone, because of the lack of extended memory, but that can be added at a later date. And, it is assembled in Australia.

END

olivetti COMPUTERS



SAVE $1700

~~NORMAL PRICE $6440~~

NOW $4740

ONLY FROM
DECCA COMPUTERS
174 Parramatta Road, Auburn
2144
Tel: 647 2744

WITH EVERY PURCHASE OF M24 20mb you get . . .

FREE WORDSTAR 2000 + Rel. II
FREE MS DOS + GW BASIC
FREE OLIVETTI DM 100 DOT MATRIX PRINTER
FREE PRINTER CABLE
FREE DELIVERY & INSTALLATION
FREE CUSTOM MADE MENU

ONLY WHILE STOCK LASTS

OLIVETTI M24 20mb Hard Disc

640K Memory ○ High Res Monitor
○ Keyboard ○ DOS 3

$3990.00

DECCA XT Turbo • 640K • 2FD • Multifunction Card • Monitor
$1795

DECCA XT Turbo HD 640K • 2FD • Multifunction Card
Monitor • 10mb Hard Disk
$2395

DECCA 286 Turbo • 512K • 1 Floppy Drive • Color Graphic Card
$1900

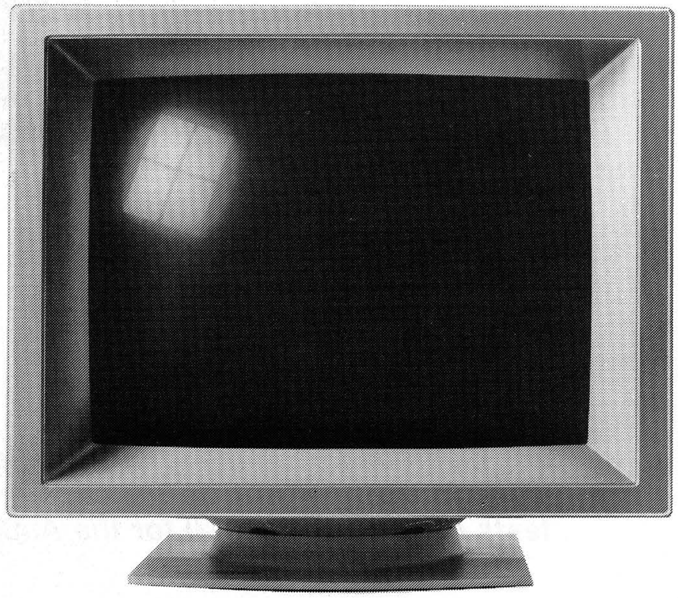
External 60mb Fast Tape back up	$1895
20mb hard card (fast access)	$1095
40mb full height hard disk. 22ms access.	$1795

DECCA COMPUTERS

174 Parramatta Road
Auburn NSW 2114

Tel: 647 2744

SALES — SERVICE LINE



THIS MONITOR COULD PUT US OUT OF BUSINESS.

The NEC MULTISYNC colour monitor is so advanced it will probably never need to be upgraded. That means once you've bought one, you'll possibly never need to replace it.

You see the MULTISYNC automatically scans all frequencies between 15.5kHz and 35kHz – which includes every colour graphics board now in use. And it adjusts itself to suit, with a maximum resolution of 800 (horizontal) by 560 (vertical). It's also compatible with IBM PCs. And all IBM compatibles.

In layman's terms this simply means that the MULTISYNC not only has a superior clarity of display. And superior database applications. But with MULTISYNC, when the time comes to upgrade your computer, you won't have the added expense of changing over your monitor.

Now despite the fact that we call the MULTISYNC the 'intelligent' monitor, it may not be the most intelligent business move we've made. However we're sure the MULTISYNC will keep you ahead of everyone else for a long time to come. To find out more telephone (02) 868 1811.

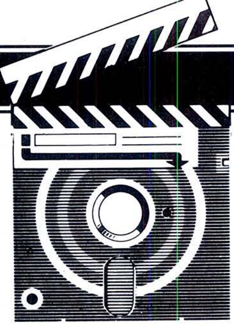
MULTISYNC™

NEC

NEC HOME ELECTRONICS

Sydney (02) 868 1811; Newcastle (049) 262466; Melbourne (03) 5449200; Brisbane (07) 277 0888; Adelaide (08) 2949033; Perth (09) 4453499.

NEC484/87 USPNeedham



Deluxe Paint II

Much has been made of so-called computer art packages, and their usefulness — or not, as the case may be — to artists. Stephen Applebaum tests out Deluxe Paint II for the Amiga, which certainly lives up to its name.

The visual representation of objects using computers has become so commonplace, particularly in the television advertising business, that few users take more than a moment's notice of such fantastical images; and even further from our thoughts is the technology that allowed the designers to paint and animate those wonderfully complex images.

Though many artists have not yet realised it, the computer has given birth to a new and important medium of expression that could lead them along creative paths hitherto unimagined. Until a short while ago, not one micro was available that had the specifications necessary to stimulate the kind of functions artists require. Now there are two: the Atari ST and the Commodore Amiga.

Commodore recognised its machine's potential as a graphics workstation right from the word go. And to make sure that everyone else did, invited the now sadly deceased Andy Warhol along to demonstrate the Amiga in his own inimitable way at its glitzy launch in New York.

But you would not have to be an Andy Warhol to draw and paint with the Amiga. We can all open up the computer's graphics treasure chest for ourselves with Electronic Arts' recently released Deluxe Paint II, an enhanced version of Deluxe Paint.

Of course, Deluxe Paint II can't make you into an artist; what it can do, though, is give you the tools to create and manipulate images quickly and 'easily'. Images which a lot of artists would probably not see as the 'be all and end all', but rather as a means to an end: the prototypes for works produced in other mediums.

But, no doubt, there will be those artists who use the computer as an art form in its own right. David Hockney, for instance, voiced his enthusiasm for the medium after being given an opportunity to work on a Xerox machine.

Any area of a picture can be zoomed in on at varying levels of magnification. Fine touching-up can be done more easily on the enlarged section

You can use any part of a picture as a paintbrush and distort it in several ways. The paintbrush can be used to paint with

Toolbox design

Deluxe Paint II's display looks very similar to that of Art Director and Degas Elite, two painting packages for the ST reviewed in the March issue of *APC*.

On top of all the usual design tools, however, Deluxe Paint II has a host of facilities which allow you to manipulate your paintings in whatever way you please. A particularly interesting feature is the ability to rotate an image of almost any size about all three x, y, and z axes.

But more of that later. First we must look at the fundamental design tools stored in the 'toolbox', the backbone of the package.

Deluxe Paint II's toolbox is displayed as a narrow, vertical strip, running down the right-hand side of the work area. At its top is a compartment containing ten built-in brushes, designed to produce different strokes.

Any one of these brushes can be modified by selecting it with the right mouse button, and then moving it diagonally across the work space until it reaches the required size. Since the built-in brushes can all be used in conjunction with Deluxe Paint II's airbrush and line-drawing tools, this ability to make your own modifications increases the package's overall flexibility.

There are four line-drawing tools in the toolbox, two of which are for drawing dotted and continuous lines freehand. The former is ideal for sketching, as no matter how fast you move the mouse, the brush always keeps up with your actions; the latter is much more sensitive to movement, and is therefore suited to more detailed work.

The other two line-drawing tools are for creating straight lines and curves.

Straight lines are drawn by clicking the points on the screen where you would like the line to start and finish. Curves, too, begin life in this way, but differ in the sense that the line drawn between the two fixed points can then be dragged to form a curve, using the cursor as a kind of hook.

Four shape tools are available for drawing filled or unfilled circles, rectangles, ellipses and polygons. Clicking the right mouse button on any of these produces a requester box with controls to change the type of fill used to colour a figure. You could for instance, select a colour range encompassing many gradations of the same hue or a pattern.

Below the shape tools there is an icon that resembles four photograph brackets. This is the brush selector, a powerful tool that lets you create your own brush out of any part of a picture; and there is no limit — other than the size of the display itself — to how big you make it.

Brushes are made by dragging a window around the section of a picture you would like to paint with. Holding down the left button during this process copies the windowed section, while holding down the right one actually cuts it from the page, revealing the background colour.

This second characteristic makes Deluxe Paint II's brush-making facility ideal for rearranging the layout of compositions, as you can pick up any piece of a page and move it to another location, without having to erase and redraw the particular portion elsewhere.

Brushes made using the method described above are generally rectalinear — that is, either square or rectangular in shape. It is possible to create a brush of virtually any shape, however, simply by double clicking on the brush selector icon. This switches off the window system, and allows you to 'fence' round a section of the page as if you were drawing a polygon. In this way, you can create a non-symmetrical brush.

If you want your custom brush to be round, you can cut around a circle drawn on the background colour using the window method and still have a brush with rounded edges, because Deluxe Paint II treats the background colour as a transparent sheet. Utilising this feature, you can make intricately shaped brushes with holes that allow a painting to show through as the brush is passed over the top.

Moving down the toolbox, a 'Grid' option allows you to overlay an invisible grid on the entire work area, making it rather like a large sheet of graph paper. Although the grid is invisible, it makes its presence known by restricting the movement of your drawing tools to specific, evenly spaced points.

Like a lot of the toolbox functions, Grid can be modified to suit your requirements. A 'gridding requester' contains options to adjust the space between points along the x and y axes. If you are working in three dimensions, a third option is included to cover the z axis.

Obviously there is not much call for a grid when you are doing freehand work, but is is indispensable when designing a repetitive pattern — something frequently done in the textile industry.

Other tools in the toolbox include 'Symmetry', which lets you draw up to 40 mirror images about a single point simultaneously; 'Undo'; 'Clear Screen'; 'Magnify' and 'Zoom'.

Activating Magnify splits the screen into two halves, displaying both the magnified section of your painting and how it looks normally. Clicking on the toolbox Zoom icon incrêases the magnification still further, enabling you to enlarge pixels up to 400 times their original size.

Located at the base of the toolbox is the palette, from where you select your colours when painting. Depending on which mode you are working in and how much memory your Amiga has, the palette can contain up to 32 different colours; and you are not confined to the paints in Deluxe Paint II's default palette. If there are specific colours that you would like to use, but which are not available, you can mix them yourself from an amazing repertory of 4096 shades, using another of the package's requester boxes.

On top of the palette is a small square containing a circle. This is the colour indicator and is used to show the current background and foreground colours. Clicking on this with the right mouse button displays a kind of 'mixing desk' for colour called a'colour palette requester'.

Every colour, as you are no doubt aware, consists of a red, a green and a blue component which means that all you have to do to create a new one is to alter the amount of each component relative to the other two.

Enclosed in the colour palette requester are slide controls for changing the intensity levels of a colour's prime components on a scale of 0 to 15. White, for example, is made by mixing the three components at maximum intensity (15), while black is mixed by lowering all three to 0.

Next to the slide controls there is a smaller version of the current palette. You can select any colour from here and then change it, simply by fiddling with its levels of red, green and blue until you have the right colour. A small box above the palette contains the currently selected colour, and shows any changes you make with the aforementioned controls. An alternative way of mixing colour is to change its hue, saturation and value. As before, these are manipulated via slide controls.

Hue, saturation and value refer to a colour's position in the visible spectrum, its strength or purity, and its black level or how much light it would reflect. It you were to mix white using this method, you would set both the

levels of hue and saturation at 6, and the value to 15, since it contains no black.

A useful function of the colour palette requester is that you can increase colour spreads composed of subtly different shades of the same hue or evenly spaced gradations between different hues. All you do to set-up a colour spread is tell Deluxe Paint II the colours you want at its extremities. The program then calculates the new shades on the basis of the properties of the first and last colours and the number of steps between them in the palette.

Deluxe Paint II's colour spread facility is useful for producing different shades of the same colour. In much the same way, it is possible to produce colour ranges, made up of tones that run into each other.

The colour palette requester allows you to define four colour ranges, all of which can then be used as a fill or paint. They can also be cycled through to produce simple animation, using a colour cycle command found in several of the menus.

Pull-down menus

So far I have only described the toolbox. There are, however, many more elements to Deluxe Paint II, all of which are dispersed throughout six pull-down menus called 'Picture', 'Brush', 'Mode', 'Effects', 'Font', and 'Prefs' (preferences).

Not immediately visible, the menu headings have to be 'uncovered' by pointing to the top of the screen and clocking on the right mouse button.

Stored away in the Picture menu are utilities for saving and loading pictures to and from disk, as well as outputting them to a printer. I'll refer to the Picture menu in more detail below, as many of its utilities cannot be understood until you are familiar with the facilities offered by the other menus.

Brushes play an important role in Deluxe Paint II, as we have already seen. Not only are they used to paint with but also to move and copy parts of a picture: a role which is greatly extended by the contents of the Brush menu. Custom brushes, made with the brush selector tool, can be saved and loaded in exactly the same way as pictures, via the Brush menu. Saved along with a brush is the palette active at the time, plus colour cycling information, and any colour ranges that were defined.

In this way, it is possible to build-up large libraries of brushes culled from pieces of past work. To get you started, Electronic Arts has included an art disk in the Deluxe Paint II package, full of predefined brushes of all shapes and sizes.

Brushes can be manipulated in a variety of different ways, producing some quite stunning effects. For example, on the art disk, there are — along with the brushes — a number of brilliantly drawn screens. One of these in particular, a depiction of the famous Tutankhamun death mask, lends itself very well to being resized and flipped.

A number of rotations are available in the Brush menu, allowing you to turn a brush, and hence any portion of a painting, through any angle, ranging from fixed steps of 90° to anything between 1° and 360°.

Apart from changing a brush's orientation, you can also distort it. 'Shear', for instance, fixes the top of a brush, leaving the rest of it free to be dragged either left or right. When applied to text, no matter what its size, Shear has the effect of italicising it. This is useful for the design of letter headings or bill posters.

Having sheared your brush, you could then bend it. Deluxe Paint II's 'Bend' function operates in both the horizontal and the vertical planes, producing some extraordinary results. By bending a brush vertically, it can be made to look as though it is stuck on the outside of a tin can.

Whereas the Brush menu items alter a brush's physical appearance, the contents of the Mode menu are concerned with cosmetic changes.

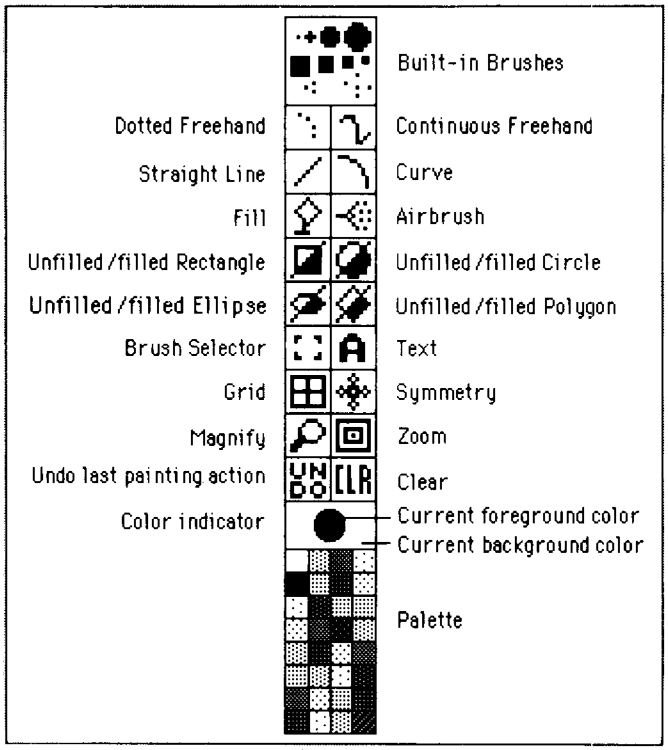
Whereas the Brush menu items alter a brush's physical appearance, the contents of the Mode menu are concerned with cosmetic changes.

'Matte', the first option in the Mode menu, displays a custom brush in its original form. 'Colour', on the other hand, washes a brush in the current foreground colour, turning a multi-coloured brush into a solid one. Using these two commands together, it is easy to create, say, a drop shadow behind an image, thus producing the illusion of depth.

Several of the Mode menu functions

Areas of the screen can be modified in several ways. One of these involves stretching corners and edges of an areas as if it were a rubber sheet

An example of perspective painting. The Tutankhamun picture has been reflected, pasted and stretched into a perspective area



Deluxe Paint II's toolbox and palette appears onscreen as a narrow, vertical strip. This is the 'backbone' of the packet

have no effect on the brush *per se*, but use it to make changes to the current painting. 'Smear' is one such command.

Moving a brush over a picture in Smear mode causes colours to run into each other, but although the colours become smeared, they do not mix and form a new hue. To make them do that, you must use the brush in 'Blend' mode. This time, when two colours meet, they combine to form a third shade.

One of the most useful painting functions in the Mode menu is 'Shade'. Using this, you can create some intricate shading effects that would otherwise be very difficult to achieve, not to mention time-consuming. When painting in Shade mode, the brush only operates on colours that are in a currently selected cycle range. Pressing the left mouse button while over one of these colours paints it with the next higher shade in the cycle range, while pressing the right button paints it with the next lower shade.

When airbrush artists paint, they often use stencils or friskets to recreate often used patterns, and to protect parts of the picture painted in a different colour. Deluxe Paint II's 'Effect' menu contains a 'Stencil' submenu with options that allow you to make your own stencils and save them onto disk for future use. Stencils, in Deluxe Paint II, *lock* certain selected colours or areas of a picture, making it impossible to paint on them.

Activating a function called 'Make' calls up a 'stencil requester'. In this is contained a version of the current palette. Clicking on any of the colours in the requester box, or on the work area, or the onscreen palette, forms an invisible mask which overlays those areas painted in the colours selected and prevents them from being painted on. This means that you can spray over a painting with the airbrush to your heart's content; the only bits which actually receive the paint being those left unselected in the stencil requester.

Placing a stencil over a painting enables you to paint in front or even behind locked areas of colour. It also means you do not have to worry about being accurate with the airbrush, as there is no way paint will be sprayed on the protected areas.

A command called 'Fix', located in a sub-menu called 'Background', also found in the Effects menu, works in a similar way to stencil. But instead of protecting a specific area, Fix locks the current picture, leaving it unaffected by anything drawn on top of it, or even the Undo and Clear Screen commands.

Three dimensions

Unlike the majority of art packages on the market, Deluxe Paint II allows you to manipulate objects in three-dimensional space, thus making it possible to give a painting a feeling of depth or perspective. Working in three dimensions can be confusing at first. Not only have you the x (horizontal) and y (vertical) planes to think about, but also a third which runs perpendicular to the screen, the so-called z plane.

Deluxe Paint II's 'Perspective' functions work on custom brushes only. To begin the process, you first have to set the perspective centre. This is a mark that can be placed anywhere on the screen, and is used to represent the viewer's eye level.

Having set the perspective centre, you then put the brush into 'Perspective' mode using a command called 'Do'. This replaces the current brush with a four-cell matrix, which can be moved anywhere on the screen: that is to say, its x axis is also the screen's x axis, and so on. Moving the mouse from left to right, therefore, moves the brush horizontally along the x axis; whereas pushing it forward moves the brush up the y axis.

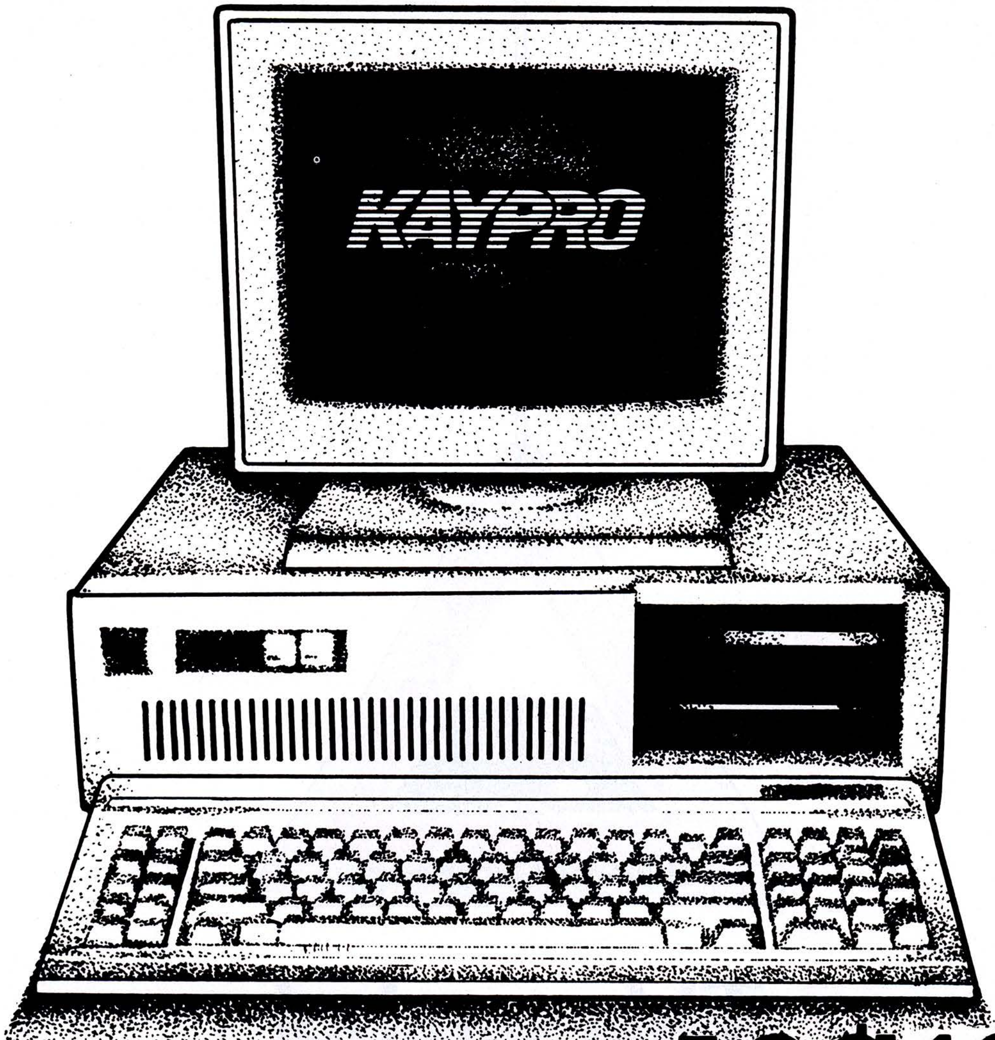
In Perspective mode, the top three rows of keys on the Amiga's numeric keypad provide the controls for rotating the brush about the x, y and z axes respectively. This is where things can become confusing.

Holding the SHIFT key together with keypad 8, rotates the brush 90° about the x axis so that all you can then see of the brush is a line, since you are looking at it end on. After a brush has been rotated, its axes become relative to its orientation rather than the screen.

Following the rotation of the brush in the example above for instance, the brush's y axis now lies perpendicular to the screen while its z axis lies along the screen's vertical plane.

Moving the mouse forward still moves the brush along the y axis, though instead of rising up the screen it goes into it, its size *apparently* decreasing as it gets further away.

Using the keypad, it is possible to rotate a brush through any angle about one or all of the three planes. Further-



Save yourself $1800 on a PC package!

Invest in a Kaypro PC/XT during February and you'll save $200 off the recommended retail price, and we'll give you over $1800 worth of software free!

Great programs too, like WordStar; MailMerge; CorrectStar; StarIndex; PolyWindows; GW- Basic; and MS-DOS 3.2.

With these programs you'll be able to do complex word processing tasks; check your spelling; manage your time & phone better; and communicate with other PC's via a modem.

The Kaypro PC/XT is made in the U.S.A. and is completely IBM PC/XT compatible.

Specifications include dual disk drives; 768K RAM; high speed NEC V20 processor; 8 Mhz turbo, dual speed switch; serial & parallel ports; clock; mono, colour and composite video output; AT style keyboard; 6 free slots; 132 Watt power supply; key lock; and 12 months warranty.

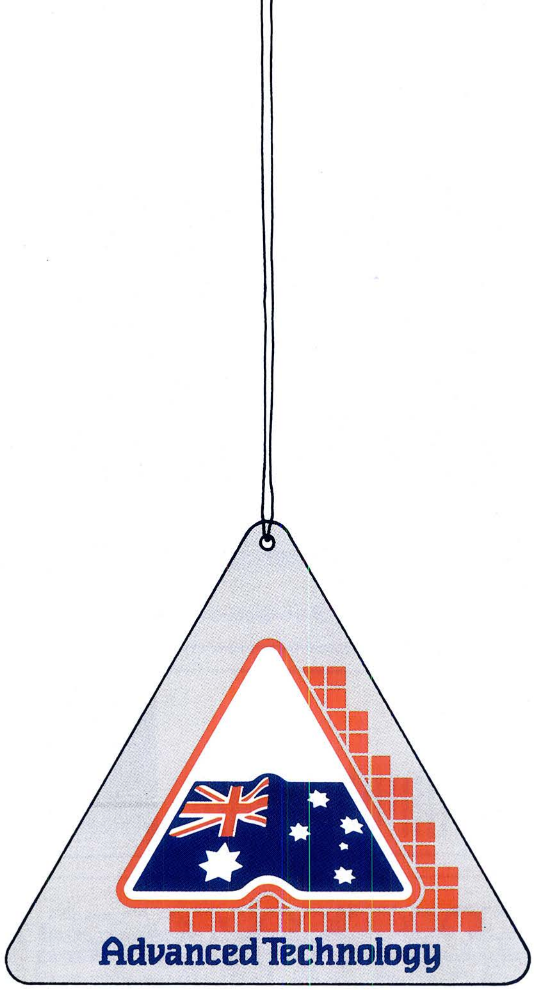
Make sure you don't miss out on owning this **$4,300 package for only $2,295**

Phone us now for more information.

Robs Computer Centre

Cnr Thomas & Scott Sts, Dandenong, 3175
Phone (03) 794 8990

AdShop/Rob 216



This symbol guarantees you won't be left dangling!

You know the feeling! So many imported boards to choose from...BUT...will they work with my hardware and software? Will there be hidden traps? Who can I talk to? Who really knows?

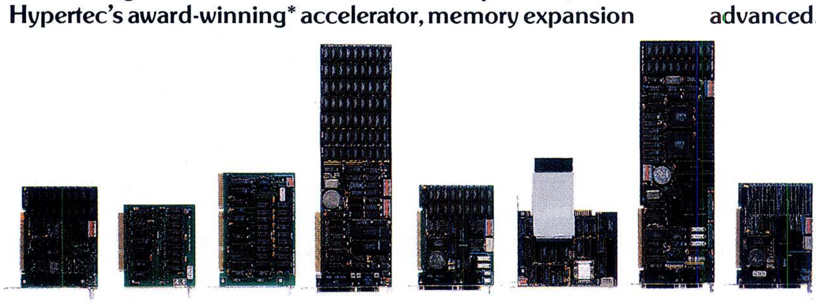
Hypertec does! And our boards won't leave you dangling!

That's why we're proud to wear this symbol. It's part of our guarantee you won't be left in any doubt about buying the best in Australian design, assembly and client service. Also, there is our full twelve-months warranty on every board.

Designed for the IBM PC and true compatibles, Hypertec's award-winning* accelerator, memory expansion and multifunction boards are world standard. And because they're Australian, local support is available to dealers and users alike from the company which designs and builds them.

Our boards are ideal for building up new PCs, and for dramatically boosting power and functions of existing PCs, avoiding expensive machine replacement. And all the back-up, advice and support you could ever want is right here on your doorstep.

Let the symbol (and Hypertec) work for you. Call us now and find out how far Australian standards and service have advanced.



HYPERTEC

Hypertec Pty Ltd
Suite 404, Henry Lawson Business Centre
Birkenhead Point DRUMMOYNE NSW 2047
Telephone: (02) 819 7222 Fax: (02) 819 7428

*Hypertec featured in the first four places in no less than three hardware categories in the 1986 PC World Class Awards.

R2557/F.P./Little

more, a brush can be made to move up and down the z axis by pressing the '"' and ';' keys. That said, it is possible to *fix* one of the three axes so that the brush can be, say, moved up and down the z axis along the y axis using the mouse.

Deluxe Paint II's 'Fonts' menu lets you load a library of fonts included on the Deluxe Paint disk. Once in memory these can be enlarged to different point sizes, italicised, put into bold or underlined. If interlace or hi-res is used with a standard Amiga monitor, the screen flickers constantly. The only remedy is to invest in a high-persistence monitor.

Conclusion

Deluxe Paint II is one of the most comprehensive painting programs on the market. One thing that is missing, though, is a keyboard overlay. Since virtually all of the package's functions can be accessed via the keyboard, I would have thought that this would have been an obvious inclusion. But that aside, Deluxe Paint II is little less than an artist's dream come true.

As mentioned above, the Picture menu contains utilities to save pictures onto disk. An extensive list of print options also lets you produce hardcopy versions of your paintings which can be printed in colour, shades of grey or black and white. Other functions allow you to specify the size of the left and right margins, and alter the aspect ratio of the picture. This last feature is particularly handy, as it means your paintings should not come out 'squashed'.

Selecting 'page size' from the picture menu reveals a requester with controls for setting the size of the onscreen page. There are three preset sizes included in the requester, though you can input your own measurements. The maximum page size possible is 1008 x 1024, but this means that you are limited to a palette of only two colours.

Deluxe Paint II can work in four screen modes, all of which can be accessed from the Picture menu. They include: lo-res (320 x 200 with 32 colours available); med-res (640 x 200) with 16 colours available); and interlace and hi-res (640 x 400 with 16 colours if memory expansion fitted).

END

Deluxe Paint II costs $229 and is available from ECP on (075) 963 488.

Toshiba 24 pin quality

Actual unretouched photo – Toshiba 24-pin printer

Make a better impression on your bottom line.

Not much more than 9 pin price

Actual unretouched photo – 9 pin printer

Many companies have opted for a 9-pin printer because of the cost savings. And regretted the quality of the print ever since.

If you want to make the best possible impression, it makes sense to talk to the people who know most about printers (after all, Toshiba were the inventors of 24-pin technology).

One look at the quality of the Toshiba 24-pin printer print-out will convince you of the improvement over a 9-pin printer. But the really good news is that you can have Toshiba 24-pin quality for around the same price as many 9-pin printers.

You'll have the choice of a range of printers with a selection of font styles and sizes, paper feeds and loading, and a range of prices. In fact, all they have in common is their technological superiority, compatibility with major PC brands, and their legendary Toshiba reliability.

There are four printers in the Toshiba 3-in-one (fast drafts, letter quality and graphics) range of printers:

P351C. The industry standard-setter, Speed, quality *and colour.* Wide compatibility, prints at up to 288 characters per second. Produces top quality printing, in colour. Super-high speed printing, in colour. Graphics, in colour.

P351. Letter quality at 100 cps. High-speed drafts at 300 cps. Superb graphics. Accepts font cartridges and downloadable font disks.

P341e. An economical printer that does a great job at high speed with automatic paper loading. Letter quality at 72 cps. Three levels of graphics quality. Wide carriage.

P321. Speed with quality and advanced functions in a compact, economy printer. Perfectly formed letters, excellent graphics. Print speeds from 72 cps to 216 cps.

TOSHIBA

ONE LESS THING TO GO WRONG

TOSHIBA (AUSTRALIA) PTY LIMITED, COMPUTER PRODUCTS DIVISION, 84-92 TALAVERA ROAD, NORTH RYDE 2113.
SYDNEY (02) 887 3322. MELBOURNE (03) 566 1700. BRISBANE (07) 352 9888. CANBERRA (062) 80 5100.

CONROY CARPENTER/TCP0280

Cricket Draw

Cricket Draw for the Apple Macintosh adds PostScript to object-oriented drawing and, according to Henry Bortman shoots to the head of the class.

Cricket draw is the most advanced and powerful graphics application you can buy for your Mac.

The biggest drawcard is that Cricket Draw does PostScript. PostScript is the page description language that makes the Apple LaserWriter tick *(See 'As you like it', April APC — Ed)*. You know all those great special effects you've seen in the sample book that sits next to the LaserWriter demo unit in your local computer store? PostScript. Without PostScript, a LaserWriter is just another Canon copier. And Cricket Draw gives you more PostScript power than any other Mac application can shake a stick at. This is an application easy enough for anyone to use, but packing power that professionals have been anxiously waiting for.

Seeing is believing

To draw, you must start with drawing tools, and Cricket Draw has a full complement of them. The top half of the tool palette contains the familiar standards: straight lines, rectangles with square or rounded corners, ovals and circles, arcs, polygons and freehand shapes. As you move down towards the bottom of the palette, things get more exciting (see Fig 1).

A new diamond-shaped tool gives you parallelograms. The 'grate' tool allows you, with a single drag of the mouse, to draw a series of either parallel straight lines or concentric circles. The straight lines can have either linear or logarithmic spacing. The bezier curve tool lets you plot curved line segments that can be twisted and reshaped in bizarre and wonderful ways by dragging their control points. (Previously, this type of tool has been available only in font-generation applications.) And the starburst tool creates just what its name implies, a set of lines radiating from a common centre.

Yet Cricket Draw's new tools reveal only a hint of what the program can do. Cricket Draw also allows you much greater freedom to fine tune the appearance of what you draw. For example, any object can be rotated and/or skewed (tilted) to any angle, selectable in one degree increments. By comparison, MacDraw can't do either; MacDraft can do rotation, but not skewing.

Double-clicking on an object invokes a dialog box that gives you very precise control over the line width, grey intensity and dash pattern of its outline, as well as the grey intensity of its interior, if it's a filled object (see Fig 2).

> *'Many developers would have stopped at the boundary of the drawing window and said, "We've given the user enough".'*

Have you ever wished you could make a line just a bit thicker or thinner than one of the half-dozen or so choices usually offered? Now you can — any thickness from 0.05 points to 99 points, in 0.05 point increments.

Ever longed for a shade of grey somewhere in between the ones available on the drawing palette? How does 0 per cent to 100 per cent in 1 per cent steps sound? It's yours. Tired of trying to create dashed lines with diagonal-pattern 'ink'? Cricket Draw offers you nine different dash patterns. And they don't get lost going around corners.

Depending on the type of object you select, you may get additional controls specific to that object type. For example, the dialog for a grate lets you set the style of grate (linear, log or radial) and the number of lines it contains. All open-ended objects, including curves, can have arrowheads on one or both ends. And wait until you see the precision with which you can control the corners on rounded rectangles.

Polygons and freehand shapes can be set to display and print smoothed or unsmoothed. And the smoothing is . . . smoooooth. So smooth, in fact, that you may find smoothed polygons more practical to work with than bezier curves. Bezier curves, noted for their exceptional smoothness, are by definition limited to exactly four points. A smoothed polygon, however, can have as many points as you like, and looks just as good.

There's more. Any closed object can be filled with a graduated grey scale, known as a 'fountain' (see Fig 3). Both the initial and final grey intensities of the fountain can be specified, as can its orientation. In addition, an object can be given a shadow, extending any desired distance and in any direction, in any shade of grey or graduated range of greys. Shadows work on open-ended objects as well as closed ones. You haven't seen anything like this anywhere before. Guaranteed. It's worth buying the program just to watch it draw fountains and shadows.

Cricket Draw has no pattern palette. This may seem strange for a high-powered drawing program, but remember that it's optimised for the LaserWriter. Bit-mapped patterns can't take advantage of the LaserWriter's resolution. In fact, they slow down printing. This is why Cricket Software opted instead to concentrate on an expanded grey scale. In contrast to bit-mapped patterns, true grey fills — both solid and graduated — are significantly improved by LaserWriter printing, and get even better when printed on a Linotronic.

However, if you still want patterns, there is something you can do. Using undocumented techniques, specifically the line screen (discussed in the sidebar 'How to Get What You Don't See'), you can produce an infinite variety of fill patterns composed of horizontal, vertical and diagonal lines.

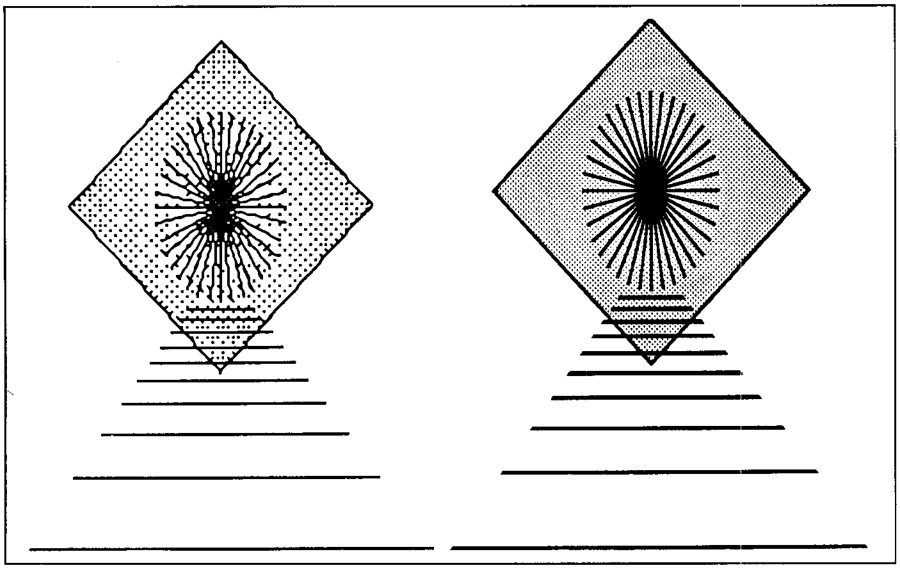


Fig 1 Cricket Draw's new tools allow the drawing above to be made with only three objects. The diamond is a basic Cricket Draw shape, not a rotated rectangle. While both the starburst and grate contain multiple lines, each can be drawn with a single drag of the mouse. On the left, the drawing as it appears on the Mac screen; on the right, LaserWriter output

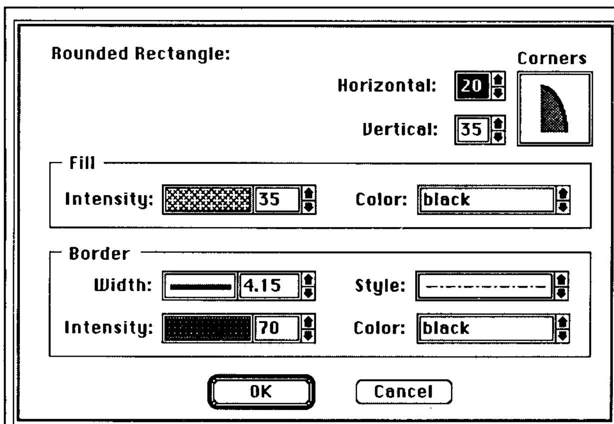


Fig 2 When you double-click on any object you have drawn on the screen, a dialog box appears in which you can set line width and intensity, fill intensity (for closed objects), dash pattern and other attributes of the object's appearance. Shown here is the dialog box for a rounded rectangle

Try playing around. Higher grey fill intensities will give you thicker lines. Higher frequencies will give you more lines per inch.

Shading your vision

Editing in Cricket Draw is far more versatile than in other drawing programs. To edit an object, select it and type COMMAND-E. For objects that can be edited — ovals/circles, lines, rounded rectangles and starbursts can only be resized — the standard resizing handles will disappear and a new set of editing handles will be displayed, one at each vertex or control point. Dragging one of these handles will reshape the object.

Using this technique, you can reduce or extend the angle subtended by an arc. You can move the corners of a grate around to create perspective-like effects. If you OPTION-CLICK on one of the edit handles of a polygon, a second, independent, edit handle appears. This is referred to as 'cusping.' The best part of this feature is that if you cusp a vertex in a smoothed polygon, it squares off. This means that you can have both straight and smooth line segments in the same polygon. SHIFT-OPTION-CLICK will delete an edit handle from a polygon.

These editing abilities are further enhanced by zooming: you can enlarge a portion of a drawing up to eight times its original size, or reduce it down to one-eighth of its size.

A thousand pictures

If you are a frustrated user of other drawing programs, you may now be wondering, "All right, so it does fancy pictures. What about text?" Good question. The inability to manipulate text on the screen while retaining the integrity of the character outlines of PostScript fonts have been the most limiting aspect of drawing programs to date. Cricket Draw meets the challenge.

You want text rotation? Skewing? Reflection on X and Y? Text in any shade of grey, instead of just black and white? Shadow text, with graduated grey scales in the shadows? Cricket Draw lets you have it all.

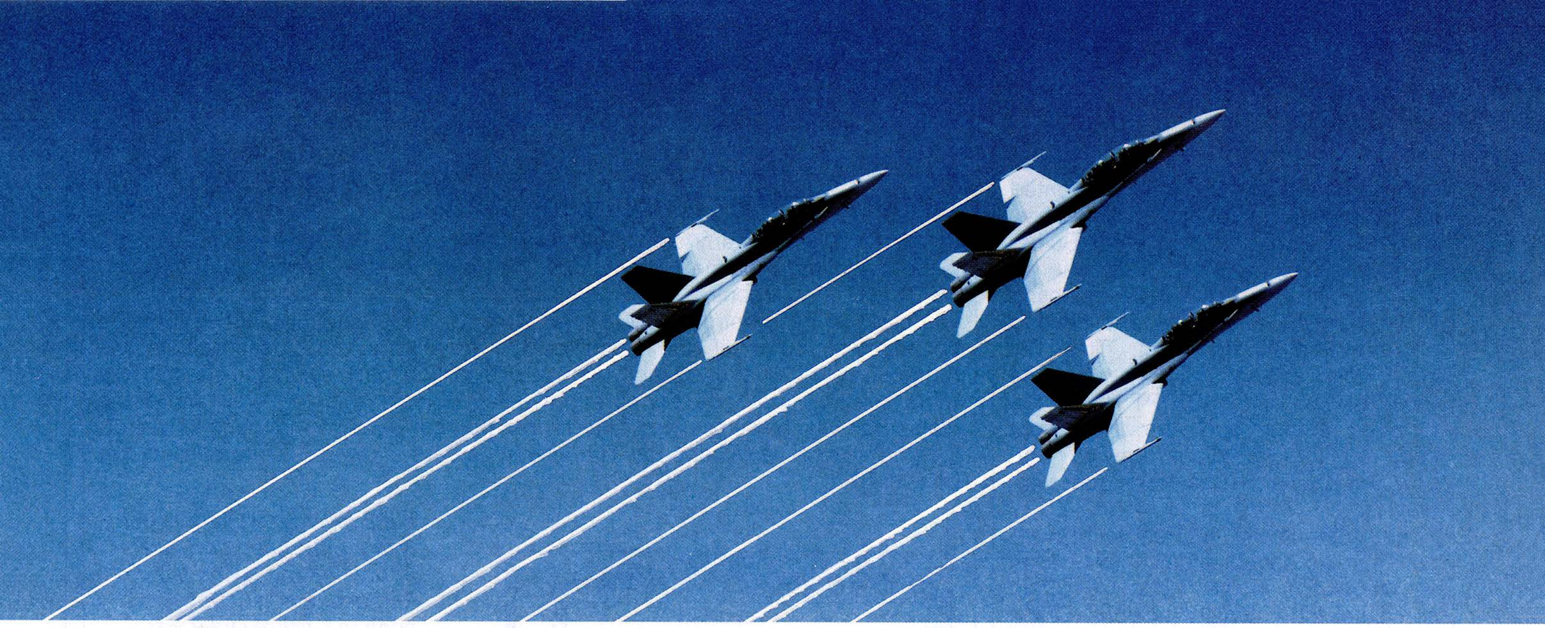
Anything else? How about text placed along an arbitrary path, such as an arc, a bezier curve, an open-ended polygon or freehand shape? No problem. Just select a text block and any open-ended object simultaneously and choose the BIND TEXT option from the Special menu. It's done. You won't see a full representation of the bound text on screen. Instead, an area filled with diagonal lines will show you where on the printout the text will appear. You'll have to wait until you print your drawing to see the actual text in position along the path.

Each text block is fully editable; just press COMMAND-E. Numerous different font, size and style combinations can appear side by side within a single block. It's even possible to edit rotated or skewed text. It will straighten up while you work on it, then pop back to its previous orientation. To edit path-bound text, you must first unbind it.

Unfortunately, text editing, while powerful, is confusing. There are five different ways to get at text. (1) The selection tool (arrow) lets you resize a block of text or move it around on the page. (2) The text tool lets you draw a new text edit box; or, if the cursor is over an existing text block, it lets you edit. (3) The EDIT TEXT choice on the Edit menu (COMMAND-E) also lets you edit text, if the block is already selected. (4) The SET TYPE choice on the Edit menu (COMMAND-T) displays a dialog box that lets you make font, style and point size changes on text that is selected. (5) There are command key equiv-alents for changing style and point size (but none is available for font changes). This all works quite differently from similar functions in other drawing programs (MacDraw, Mac-Draft, the draw layer of SuperPaint), and takes some getting used to. At first, you may feel the program is working against you.

PostScript

Cricket Draw does PostScript and I've discussed a number of ways in which



WE COULD TELL YOU THAT THE SAMSUNG CORPORATION MANUFACTURES THE ELECTRONICS FOR SUPERSONIC JET FIGHTERS, BUT THE QUALITY OF THEIR COMPUTERS SPEAK FOR THEMSELVES.

When you consider that the Samsung Corporation is one of the world's leaders in the field of aviation, involved in the electronics and communications for civil and military aircraft, then the quality of their computers speak for themselves.

Samsung is a U.S. $12 billion company, with many years of experience in the computer and peripherals business. In fact, the Samsung Company ranks in the top 40 of Fortune 500's listing of International companies.

The Samsung Amber TTL monochrome monitor is destined to become a benchmark in Australian personal computing. With its extra high resolution screen and its inbuilt tilt with swivel stand, this monitor is the very best. Add to that, its revolutionary flat non-glare screen and you will see why Samsung's computers, speak for themselves.

The Samsung range of computers are supported and distributed by the

Amust Computer Corporation,
350 South Road, Moorabbin
Victoria 3189. (03) 555 3644

Sub Distributors

Castle Technology Holdings P/L,
Rydalmere Business Park,
Unit P2, 10-16 South Road,
RYDALMERE NSW 2116. (02) 684 4999

Technology Wholesalers (Aust) P/L,
532 Lutwyche Road,
LUTWYCHE QLD 4030. (07) 357 5521

Model	RRP (ex Tax)	Tilt Swivel Base Inc.	Anti-Glare Screen Inc.	New Look Flat Screen	Video Band Width	Scan Freq.	Operating Temp.	Weight	Hidden Front Cont.	Heavy Duty Cabinet	Active Display Area
SAMSUNG GR2F	$225.00	✓	✓	✓	20 Mhz +	18.432 Khz	−10°C to +50°C	8.1 kg	✓	✓	210 mm x 160 mm
TAXAN KX 123	$340.00	✗	✓	✗	20 Mhz +	18.432 Khz	−10°C to +40°C	9.0 kg	✗	✗	220 mm x 160 mm
THOMSON TH 3102 IG	$250.00	✗	✓	✓	20 Mhz +	18.432 Khz	0°C to +40°C	6.0 kg	✓	✓	190 mm x 140 mm
QUBIE HR39	$320.00	✓	✓	✗	20 Mhz	18.432 Khz	−10°C to +50°C	9.8 kg	✗	✗	204 mm x 135 mm

AND THAT MAKES THEM AMust

AMUST 001

the program gives you unprecedented interactive access to PostSript's power. But Cricket Draw really does PostScript.

You can see the PostScript code for any drawing you make by selecting NEW from the File menu and clicking on the PostScript button. This will open an editing window. Choose GENERATE POSTSCRIPT from the Goodies menu and the PostScript code for the frontmost drawing window will appear in the PostScript window.

The contents of a PostScript window can be saved either in brief form — just what's in the window — or in complete form, which includes Cricket's PostScript header as well. This header is a wealth of information for anyone interested in the language. Cricket has revealed exactly how it accomplished every one of its PostScript techniques. And it's reasonably readable code, unlike some other PostScript headers that the hackers among you may have tried to decipher.

You can modify the code in a PostScript window — it's simply a text file. Your changes are not reflected on the screen, but you can download the contents of the window directly from Cricket Draw and see their effects on the resulting printout. If you don't like what you see, just try again. You can use the code generated by Cricket Draw as a building block for your own programs, making only minor modifications; or you can get as elaborate as you want. There is also a complete on-line PostScript help function, which shows you the proper syntax for and a short description of nearly every operator (primitive command) in Adobe's PostScript Reference Manual.

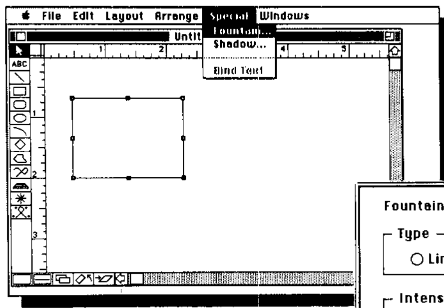
We really have to hand it to Cricket Software for providing this feature. Many developers would have stopped at the boundary of the drawing window and said, "We've given the user enough." You would never have seen their hard-earned PostScript secrets, and if you did, they'd be virtually unintelligible. Instead, Cricket went the extra way and provided a full-scale PostScript laboratory as well as a great drawing application. It's a welcome change to see software done with the user in mind.

If, on the other hand, you have no interest in the hidden mysteries of PostScript, you can ignore this part of the application altogether. You'll still have all the power of the drawing program at your command. The two operate independently.

How to get what you don't see

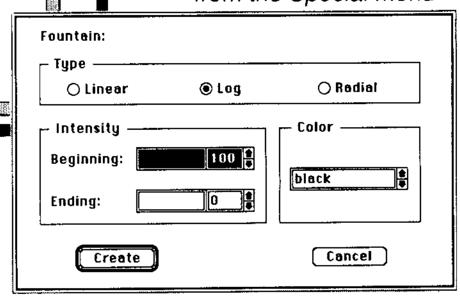
Cricket Draw, like many other Mac applications, has hidden treasures waiting to be discovered by the adventurous. My favourite is accessed by OPTION-CLICKING the fill control in the lower left corner of the screen. Normally when you click on this control (without the Option key depressed), you get a dialog box that lets you modify the intensity of the grey fills for any closed objects currently selected or subsequently drawn. But if you hold down the Option key while clicking, with one or more grey-filled objects selected, you will get a dialog box which will give you access to a number of additional options that affect the way greys will appear. The examples here show you some of what can be achieved.

Fig 3 Filling a closed object with a graduated grey scale (fountain) and giving it a custom-designed shadow are a snap in Cricket Draw. (a) Draw a closed object, select it, and choose FOUNTAIN from the Special menu

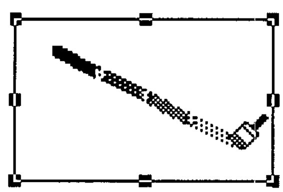


a.

b) Choose the fountain type, beginning and ending intensity and colour



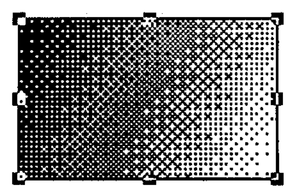
b.



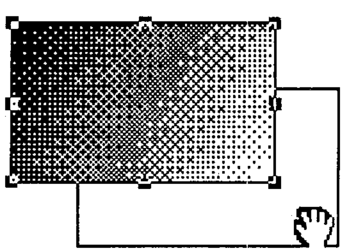
c.

c) Drag the paintbrush cursor across the object at any angle

(d) A fountain will fill the object

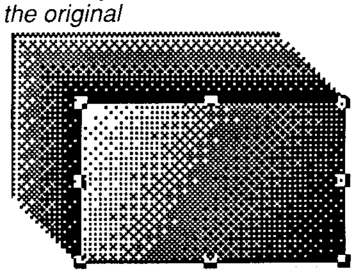


d.

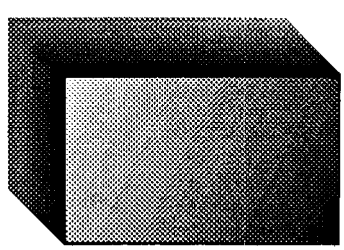


e.

(e) Choose SHADOW from the Special menu and set the appropriate options in the Shadow dialog box (not shown). Use the hand cursor to drag a shadow out from 'behind' the object, in any direction and any distance from the original



f.



g.

(f) The shadow will display on the screen and (g) the final product, printed on a LaserWriter

Dot to dot

Although Cricket Draw is optimised for PostScript, it is fully compatible with the ImageWriter. Of course, while a PostScript printer will often improve on the screen image, the printout from an ImageWriter will mirror the screen pixel for pixel. Text effects like rotation and skewing, in particular, which require better than 72 dpi to show their stuff and which therefore look ragged on the screen, will look equally rough when printed on an ImageWriter.

However, there is one distinct advantage Cricket Draw offers to those with an ImageWriter II: colour. Colour, along with line width, grey intensity, and so on, is one of the attributes that can be selected from the dialog boxes that appear when you double-click on an object. Grey intensities, fountains and shadows all work with colour as well as with black and white. Of course you can't see colour on the screen — not yet, anyway — but you can create four-colour graphics on ImageWriter directly from within Cricket Draw. No additional utility program is required to generate colour output.

Many early users of Cricket Draw reported problems when trying to print their files, particularly when printing to Linotronics. I had this experience myself with one file that printed fine on a LaserWriter but thumbed its nose at me when I tried to get Lino output. Cricket has been working feverishly to overcome these problems since Draw's initial release. As we went to press, it had just released an upgrade, version 1.01, which it claims has resolved most of the reported problems. This new version was not yet available for testing at press time.

To see is to know

Cricket Draw's user interface is excellent. In designing a user interface for Macintosh software, it's easy to get carried away. It's hard to create a good balance between power and simplicity. Decisions about things like the organisation of the menus, the assignment of command keys and the use of dialog boxes must be made carefully. Otherwise, the interface will end up obscuring a program's capabilities, rather than providing easy access to them. There is one area in Cricket Draw — text editing, already mentioned — that can use some improvements. But on the whole, the Cricket Draw interface is so well done that anyone who understands the distinction between bit maps and objects, can, if given the simple advice "Try double-clicking," learn 90 per cent of Cricket Draw in 30 minutes — without the manual.

A program's user interface and its written documentation are two sides of the same coin. They both contribute to or detract from the ease with which the user can get a job done. Cricket has done a solid job on both. The manual has clear, accurate explanations. It is well organised and extremely well illustrated. There are a few places where there could have been a bit more explanation — not because what's there is inadequate, but because you get the feeling there has to be more to the story. Cricket is planning to release an ongoing series of technical notes about Cricket Draw, with pointers on how to get the most out of the product, and, alas, workarounds for any bugs that crop up. These notes will be made available to registered users from InfoMagic, (the Australian distributor of Cricket Draw) for a small fee. The first set of such notes, detailing changes that were made in the software after the manual was printed, is included in the Cricket Draw package. Registering will also guarantee that you'll be notified of upgrades.

There is one last thing that should be mentioned. The largest drawing you can make with Cricket Draw is one page. You can have lots of windows open at once, but only one page apiece. When we asked the developers about this, they said that they had discussed the subject with a lot of people who use other drawing programs, and found that the overwhelming majority of them create multipage drawings for the sole purpose of reducing them in order to achieve

Now you see it, now you don't

Standards are a wonderful thing. The computer world is full of them. Like the RS232 'standard.' Or 'standard' ASCII text files. The Macintosh has graced us with yet another, the 'standard' PICT file format. There are several different programs that generate PICT files, among them MacDraw, MacDraft, SuperPaint, and now Cricket Draw. Others, such as PageMaker and ReadySetGo can't produce PICT files but can read them.

PICT is supposed to make it easy to move graphics from one application to another. But reality isn't always as accommodating as the paper world in which standards are written. So here's the low-down on what works and what doesn't with the initial release of Cricket Draw. The most reliable transfer is from MacDraw into Cricket Draw. This can be successfully done either with MacDraw files themselves or with PICT files created in MacDraw. The only surprise is that, since Cricket Draw has no fill patterns, MacDraw objects filled with patterns other than shades of grey will be converted into grey-filled objects in Cricket Draw.

MacDraft files cannot be read directly by Cricket Draw. PICT files created by MacDraft can be read by Cricket Draw, but the fill patterns will not transfer at all; filled objects will all become unfilled.

If you try to read a SuperPaint PICT file into Cricket Draw, the system will crash.

And in the 'oops' department: Cricket Draw (version 1.0) can't read its own PICT files. So, if you save a Cricket Draw drawing in PICT format for export to another application, save a second copy of it in Cricket Draw format. Otherwise, you will not be able to make any further changes to it.

So much for bringing PICT images into Cricket Draw. Going the other way, the most reliable transfer is into ReadySetGo 3.0. I am told — although I didn't have a copy to test it myself — that Cricket Draw PICT files can be ported to ReadySetGo 3.0 with no problem, and that they will print properly. A handy hint: when you create the PICT file, hold down the Option key while you click on the Save button. This will generate a PICT file in which the screen image is a bit-mapped image, rather than an object-oriented image. The bit-mapped screen image will scroll much more rapidly in ReadySetGo than its object-oriented counterpart. You will still get the full benefit of the LaserWriter's resolution when your drawing prints, since the PostScript commands are exported to ReadySetGo along with the bit-mapped screen image.

As for PageMaker, wait until version 2.0, which will be fully compatible with Cricket Draw PICT files. Since version 1.2 uses Aldus Prep instead of Laser Prep (like everyone else does), and since Aldus Prep was not designed to handle the PostScript that is embedded in Cricket Draw PICT files, the latter can be read into PageMaker, but will not print properly.

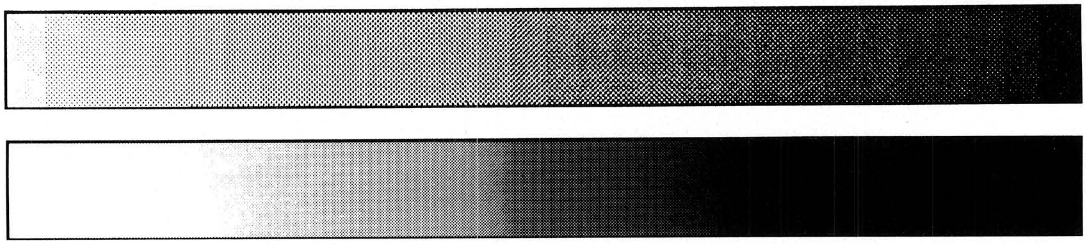


Fig 4 the 1270 dpi resolution of the Linotronic 100 yields a smoother gradation of greys in fountain-filled objects (bottom strip) than does the LaserWriter with its 300 dpi resolution (top strip)

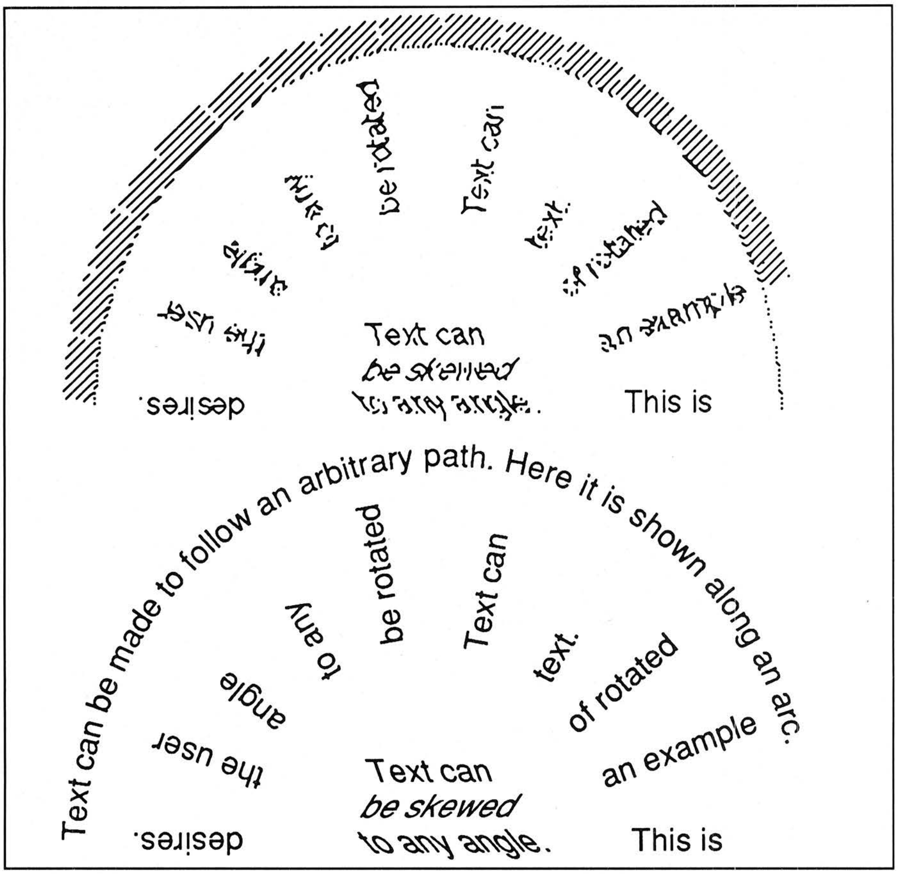


Fig 5 Text can be rotated or skewed to any angle in one degree increments. It can also be placed along any arbitrary path. On the top, the modified text as it appears on the screen. On the bottom, LaserWriter output

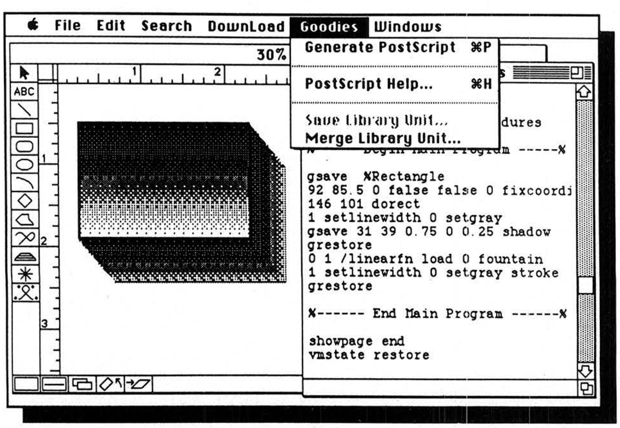


Fig 6 You can see the PostScript code for a Cricket Draw drawing by opening a PostScript window and choosing GENERATE POSTSCRIPT from the Goodies menu. What appears in this window can be saved on disk as a text file. It can also be edited — if you know PostScript — and downloaded to a printer directly from within Cricket Draw

an effective increase in the resolution of their final images. Very few people outside of the CAD world actually need to make large final drawings, which requires taping pages together.

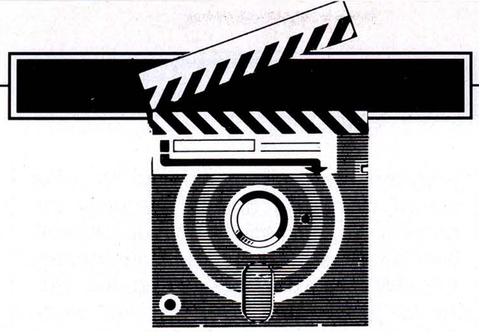
Since Cricket Draw is not a CAD program, a single page was deemed adequate. Those who are looking for increased resolution can achieve it in Cricket Draw by setting the reduction percentage in the Page Setup window to less than 100 per cent (25 per cent is as low as you can go). This expands the rulers in the drawing window proportionally, allowing you to draw on a piece of 'virtual paper' as large as 76cm wide x 100cm high. When you print, however, it will be reduced to a single sheet.

Conclusion

Cricket Draw is hot, and anyone with an interest in serious drawing or playful drawing or general playing should consider buying this program. Take a long look at what it can do and I think you'll see what we mean.

Cricket Draw costs $646 and is available from InfoMagic, PO Box 131, Eastwood NSW 2122. Tel: (02) 858 4111.

END



Putting on the style

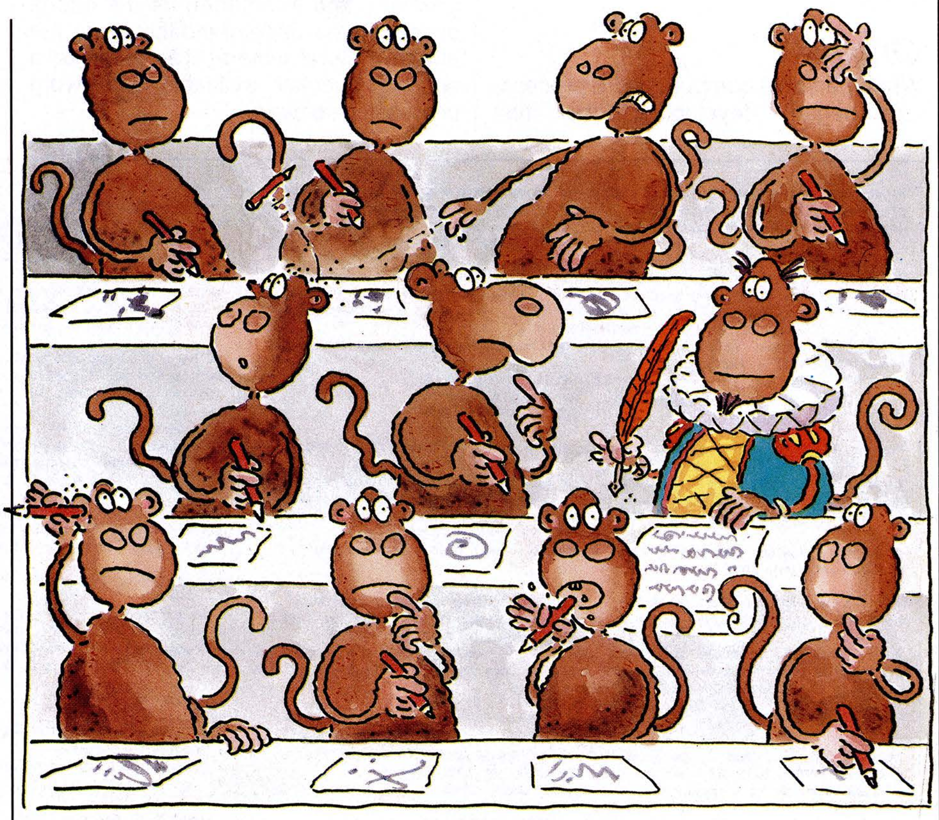
The concept of style is hard to define but many feel that it is more than a thorough grounding in grammar and syntax. Style analyst packages are designed to improve even the poor writer's work, but do such packages fulfil their literary expectations? Jonathon Green presents his controversial view.

Everyone, says the old myth, has a novel in them somewhere; this is patently untrue. There is more to writing than waving a pen or slapping keys, and the myth has yet to extend to company reports, office memos, share prospectuses and printer manuals.

It's unfortunate that, while a variety of circumstances conspire to stifle the creative fantasies of potentially great novelists, the task of writing these printer manuals, share prospectuses, and so on, is delegated round the office with hardly any thought on the part of delegator or delegatee.

It often seems that, while those hypothetical typewriting monkeys have finally abandoned their attempts to reproduce the works of Shakespeare, it is evident that they have been harnessed by the software and hardware manufacturers.

State of the art word processing equipment does not an author make. Can anything be done to help?



What is style?

Style is essentially an abstract concept. For it to be subjected to a computer-based analysis there must be some concrete interface between the idea of style and a means of analysing it. Fifth generation machines and their software may offer something more sophisticated but contemporary programs are subject to certain limitations. Thus the basis of all style analysts is two 'style indices': the 'Yardstick Index' designed by Ruldolf Flesch and the better known 'FOG Index' created by Robert Gunning. They both depend upon the counting of sentences and of syllables to produce a formula for the *readability* of a piece.

A further refinement has been developed by American lexicographer Hugh Rawson who offers in his *Dictionary of Euphemisms* (1981), the 'FOP (FOG or Pomposity) Index', which is a means of assessing the self-deluding circumlocution of a euphemism.

The FOG Index

The FOG Index is explained in detail in Gunning's book *The Technique of Clear Writing* (McGraw Hill, NY, 1968). Stripped to the essentials that provide the mechanisms of these analysts, it works thus:

1 Take a piece of writing (or if it is a long one, take several random chunks of around 100 words each) and count both the component sentences and the total number of words. If a complex sentence is divided by semicolons, thus denoting a number of discrete and complete thoughts, these should be counted as individual sentences.

Divide the total word count by the number of sentences to obtain the average sentence length.

2 Count the number of words of three syllables or more per hundred words. Don't bother with proper names, words that are combinations of shorter, simple words — for example: 'manpower' or 'book-keeper', or verb forms that gained their extra syllable by including such common suffixes as '-ed' or '-es'. This total will provide one with the percentage of hard words in the piece.

3 Obtain the FOG Index by adding the totals together and multiplying by 0.4. The resulting figure is expressed in the form of the reading levels expected from the grades or classes of American schools. These begin at age five with first grade and continue thereafter.

Origins

When personal computer word processing began developing, the first programs set out primarily to offer speed of editing and a gradually improving sophistication of visual appeal, with headers, footers, page numbering, WYSIWYG text displays and the like. As far as the content of the text went, there was certainly speed, although that was still cumbersome at the beginning, but little else. You wrote your piece and its consumer ploughed on through.

The computer acted as a tool that made the writer's job slightly easier and faster, by allowing mistakes to be corrected instantly and so improve the work's presentation. No software was available that allowed the computer to use its 'intelligence' to examine what was being written and to suggest to the author ways of improving the writing, grammar or spelling.

The first attempts to improve on this situation, and to smarten up the efforts of those who understandably were not always natural writers, was to make a spelling checker available with word processing software.

Early examples simply consisted of a long list of words (around 40,000, which is over twice the size of most people's vocabulary) held on disk. A special program would then scan a document word by word, making sure that every word in the document also appeared in the on-disk dictionary. Any words that did not appear were considered to be spelling or typing errors on the part of the document's creator. These were highlighted in some way so that, once the spelling checker had finished its work, the user could re-edit the document and fix the offending words by looking them up in the real paper dictionary.

This facility seems primitive by today's standards. The dictionaries were usually American and, for anyone with a reasonable vocabulary, fairly limited. This was especially true for scientists, medical and financial people, and others whose profession used many jargon words which were considered 'errors' by the software. It was possible to update the disk diction-

```
A very strange phenomenon occurs when you show someone a new word processing
program.  Within 5 seconds, they've usually made up their mind whether to
love it for ever or to openly despise it for the rest of their days.
                              <<* 17. LONG SENTENCE:  26 WORDS *>>^

It's hard to explain what makes the ideal word processor - ask a hundred
people and you'll get two hundred different answers.  Perhaps the opinion
that will occur most is "it has to feel right".  All that a software company
              <<* 14. INVERTED PUNCTUATION *>>^
can do, therefore, is to keep churning out new packages and hope that they
"feel right" to enough people.
                              ^<<* 22. SPLIT INFINITIVE *>>
                <<* 17. LONG SENTENCE:  24 WORDS *>>
                              ^<<* 31. COMPLEX SENTENCE *>>

For me, PC-Write doesn't "feel right".  As soon as I loaded it for the first
    <<* 14. INVERTED PUNCTUATION *>>^
time (5 days ago), I felt it lacked that certain something.  After around 40
hours of using it (the loneliness of the long distance software reviewer) I
still feel the same way although, to some extent, my reasons have changed. My
                              <<* 17. LONG SENTENCE:  29 WORDS *>>^
original thoughts, especially that it doesn't feel like a professionally
written program, remain.

There's no doubting that PC-Write is a pretty complex piece of business
software.  It is designed to be a word processor and it does its job fairly
                           ^<<* 21. PASSIVE VOICE: is designed  *>>
well.  However, it's not something that I would use regularly and, once I've
finished writing this review, I shall get my copy of Word Perfect out of the
cupboard and delete PC-Write from my hard disk.
          <<* 17. LONG SENTENCE:  36 WORDS *>>^
                 <<* 31. COMPLEX SENTENCE *>>^

Despite the fact that I, personally, don't like PC-Write, I accept that a lot
  <<* 2. WORDY. REPLACE Despite the fact that  BY although  *>>
of people think it's wonderful, the editor among them.  I also
                         <<* 17. LONG SENTENCE:  26 WORDS *>>^
                                <<* 31. COMPLEX SENTENCE *>>^
realise that many people who buy the latest version will think
it's the best thing in word processing since the early days when you had to
write your text by poking holes in reels of paper tape with a blunt pencil.
                              <<* 17. LONG SENTENCE:  45 WORDS *>>^
The remainder of this review, then, will attempt to be a fair, independent
assessment of what makes PC-Write a good or bad product.
                     <<* 17. LONG SENTENCE:  24 WORDS *>>^
                            <<* 31. COMPLEX SENTENCE *>>^


The History
-----------
PC-Write began life in the USA, as a user supported program.  That means that
anyone could copy it, give copies to their friends, put it on bulletin boards
and do whatever they liked with it.  If you were given a copy and you didn't
             <<* 17. LONG SENTENCE:  24 WORDS *>>
                                  ^<<* 31. COMPLEX SENTENCE *>>
```

The verdict according to RightWriter

```
A very
------> very
* At sentence 1 - 'V' - Vague adverb
* Press: RETURN to continue
*   or  Q first to quit checking

strange phenomenon occurs when you show someone a new word processing
program.  Within 5 seconds, they've usually made up their mind whether to
love it for ever or to openly despise it for the rest of their days.

It's hard to explain what makes the ideal word processor - ask a hundred
people and you'll get two hundred different answers.  Perhaps the opinion
that will occur most is "it has to feel right".
-------> .
* At sentence 4 - 'P' - Punctuation error
* Suggestion: .,?, or ! before "
* Press: RETURN to continue
*   or  Q first to quit checking

 All that a software company
can do, therefore, is to keep churning out new packages and hope that they
"feel right" to enough people.

For me, PC-Write doesn't "feel right".
-------> .
* At sentence 6 - 'P' - Punctuation error
* Suggestion: .,?, or ! before "
* Press: RETURN to continue
*   or  Q first to quit checking

 As soon as
-------> as soon as
* At sentence 7 - 'W' - Wordy phrase
* Suggestion: when
* Press: RETURN to continue
*   or  Q first to quit checking

I loaded it for the first
time (5 days ago), I felt it lacked that certain something.  After around 40
hours of using it (the loneliness of the long distance software reviewer) I
still feel the same way although, to some extent, my reasons have changed. My
original thoughts, especially that it doesn't feel like a professionally
written program, remain.

There's no doubting that PC-Write is a pretty complex piece of business
software.  It is designed to be a word processor and it does its job fairly

-------> fairly
* At sentence 11 - 'V' - Vague adverb
* Press: RETURN to continue
*   or  Q first to quit checking

well.  However, it's not something that I would use regularly and, once I've
finished writing this review, I shall get my copy of Word Perfect out of the
cupboard and delete PC-Write from my hard disk.
```

What Grammatik made of APC's text

NEC 30% OFF

★ APCIV POWERMATE

fully "AT" compatible with quick access 20Mb hard disc, 1.2Mb floppy drive, 640K RAM, Multi-sync Advanced Graphics Colour Monitor and A.G. card ("E.G.A." resolution), 8MHz 80286 processor, 101 keys, serial and parallel ports

PLUS

★ NEC P7 PRINTER

with 24 pins, 136 columns, 8K buffer, quiet mode, and cable

★ ***PLUS*** ... "A.T.S. Utilities" software, with System Menu, MS-DOS tutorial, Letter Writing, Appointments, Bookkeeping, Note Pad, Address Labels and various utilities

★ ***PLUS*** ... E.B.A. Integrated software for Debtors, Creditors, General Ledger and Stock ... all for:

$5,990 inc tax

This incredible price represents a saving of approximately 30% off recommended retail prices. And all our clients may make free copies from our wide selection of Public Domain software, including W.P., Database, Spreadsheet, Accounting, Games, Utilities, etc.

FURTHER SAVINGS...

NEC APCIV POWERMATE
(20MB, "E.G.A." Colour Monitor) **$4,990 inc. tax**

NEC APCIV-AG
(40MB, "E.G.A." Colour Monitor) . **$7,530 inc. tax**

NEC MULTISPEED PORTABLE
(9.54 MHz, 2x720K drives, 640K) **$2,985 inc. tax**

NEC SILENTWRITER
(prints 8 pages per minute) .... **$4,590 inc. tax**

NEC ELF PRINTER
(Letter quality up to 19 c.p.s.) .... **$690 inc. tax**

NEC P6 PRINTER
(24 pin, 80 column) .... **$855 inc. tax**

NEC P7 PRINTER
(24 pin, 136 column) .... **$1,115 inc. tax**

FREE "A.T.S. UTILITIES" with each purchase.

Phone for more great savings on any NEC computers or printers . . .

At A.T.S. COMPUTING we specialise in NEC products simply because we know of no other more reliable, better priced, compatibles. And remember, we can arrange NEC on site service for your computer and printer for as little as $155 in the first year in any capital city. Why not join our many satisfied clients from small medical and dental practices to some of the largest companies and government institutions?

We'll be selling NEC,
and only NEC,
for years ...

N.S.W. (02) 439 2277 • (02) 858 5999 • (042) 28 9990 • (043) 28 1859
(049) 26 5484 • (060) 41 1244 • (067) 66 7959
A.C.T. (062) 57 3420
VIC (03) 690 9196
QLD (07) 221 6198, (077) 72 4112
S.A. (08) 51 3947
W.A. (09) 328 2972
TAS (002) 31 1757.

A.T.S. COMPUTING

"Advanced Technology + Service"

Mail to: A.T.S. COMPUTING, 1039a Victoria Road, West Ryde, 2114

YES Please send information on ....

Name:

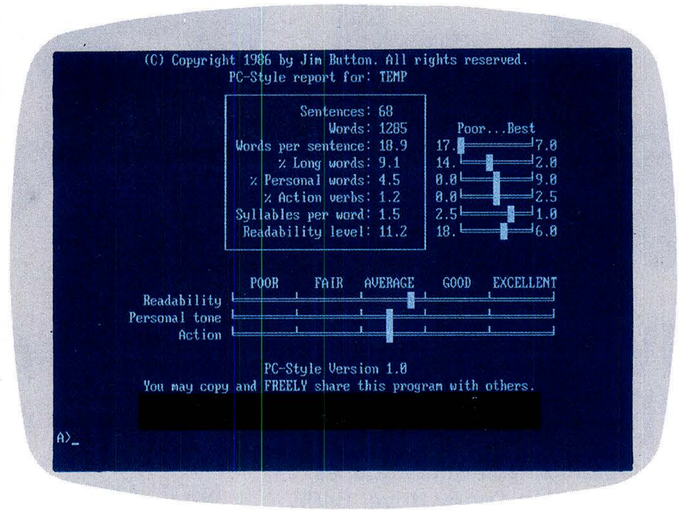
Address:

Tel:

ary so that suspect words would not be highlighted a second time, but the process was slow. Despite all this, early spelling checkers were received enthusiastically at the time by non-spellers and non-typists alike.

Software continues to improve and so naturally do the spelling checkers, although there's still plenty to be said for the *Concise Oxford Dictionary*. Most allow the user to augment the basic vocabulary, but amateur lexicography is time consuming and presumably not of immediate interest.

Modern spelling checkers contain not only much larger dictionaries (up to 150,000 words) but also have facilities for guessing the correct spelling of words that do not appear in the computerised word list. Two common typing mistakes, for example, are to omit a letter or to transpose two letters. Armed with these facts, a modern spelling checker like the one included with Word Perfect can come across the word 'paralel' in a document, and, instead of just saying 'WORD NOT RECOGNISED — RETYPE', suggests to the user that perhaps 'parallel' is the right word.



PC-Style analyses an ASCII text file and presents its results as a single screen of scales and figures. Although it is less thorough than Grammatik or RightWriter, it is by far the fastest at doing the job. A customisation program is provided which lets you change the upper and lower limits of the scales.

Introducing intelligent style checkers

Moves to improve the situation, and to give a greater 'veneer' of literacy to those whose talents lie in other directions but whose responsibilities force them to use the keyboard, have been increasing of late. A variety of programs that can be loosely grouped as 'style analysts' have been appearing. Exactly what these programs attempt to do, I'll explain shortly.

In 1982, IBM's Thomas J Watson Research Centre began developing Epistle: '*a tool that can be used by editors to perform routine but essential tasks that ordinarily require a great deal of time.*' This 'text critiquing system' could detect fourteen common grammatical errors. For example, it kept details of the conjugation of many verbs, so if you were to type 'The men is going to work' the error would be picked up. The program was designed for mainframes and did not enter the PC market place.

There exists today a number of 'analysts' for work produced on a PC. I don't know of any Australian companies who have launched such products, but I have come across three reasonably priced offerings which, although American, are still quite suitable for use in Australia and can be imported either by dealers or by anyone with a phone and a credit card. The programs in question are RightWriter, Grammatik and PC-Style. PC-Style is available locally from PC-SIG in Sydney under the Shareware concept.

Each runs on a standard IBM or clone with MS-DOS version 2.0 or later, and 256k of memory.

The essence of all three programs is that they will improve your writing. The blurbs rub this in with a variety of adjectival buzzwords, but in the end what they offer is a means of cutting down on basic grammatical errors, beefing up one's weaknesses and cutting down on stylistic excess or obscurity. A small dictionary is usually included.

Such a dictionary is not designed as a spelling checker, and the manual warns you not to fill it with common words. It's supposed to be a jargon list that can be used by the program to build up an index of how jargon-ridden your text is. RightWriter comes with a number of jargon dictionaries, and you can adapt these yourself or write others from scratch if you have the RightWords utility program — an optional extra.

Style-checkers are not designed to create best sellers, nor do they guarantee writing perfection but, without exception, they promise clearer, punchier prose.

How far can PC programs go?

The sophistication of style checking programs on a PC is on a par with expert systems. Expert systems programs which form conclusions based on rules that you have typed in are really only found on mainframes. Such systems can not only manipulate the rules to form conclusions, but can often invent totally new rules using a form of artificial intelligence. Trying to do this sort of work on even the latest model PC would take too much time to be practical. So, although you can buy expert system programs for personal computers, they are not in the same league as their big brothers and, in reality, are simply front end query languages for databases.

Style checkers on PCs can be said to be little more than massive look-up tables. For example, the program might contain a list of 500 cliches and, if one is spotted in the text being checked, the user is alerted. There's nothing clever in the way this is done. Indeed, if your word processor has a macro facility you could program the whole operation onto one key and do the job just as well, though probably not as fast.

The three PC packages I have been looking at perform two basic tasks when style checking a piece of work. Actually, PC-Style performs only one of them, but otherwise works in the same way. First, the programs count the number of words, full stops and other special characters in the text and present you with some straight numbers and percentages.

The sort of information you get would be the number of words in the document, the number of sentences, number of paragraphs, average number of words per sentence and, based on something like the FOG Index, a guide to the readability of the piece. The programs often contain a jargon dictionary, and by checking which words in the text also appear in the dictionary, you get a

"STAFF"—A brand name built on high quality & prompt delivery

KEYBOARDS FOR PC/XT/AT

STAFF-2P AT

COMPACT DESIGN, HIGH PERFORMANCE!
This fantastic "BABY AT" is a well-developed system with enhanced compact hardware and fully PC/AT software compatible. The STAFF-2P AT is surely an ideal choice for any imaginable computing need.

STAFF-2H TURBO XT

The STAFF-2H utilizes the advanced 8088-1 or NEC V-20 microprocessor to enhance the processing speed switchable from 4.77 to 10 MHz by either hardware switch or software switch, 90% faster than IBM PC/XT. This super TURBO PC is designed to minimize the material cost by using 4464 RAM chip instead of 4164 chip to upgrade your profit.

STAFF-K8AX

FCC ID: FKD46AK8AX

* 84 keys
* XT/AT compatible

STAFF-K9AX

FCC ID: FKD46AK9AX

* 105 keys
* XT/AT compatible
* Special functions keys: Key-in lock; Fast repeat; Previous word; Next word; Line feed; Pause; Clear screen; Reset; Break

STAFF-K101

FCC ID: FKD46AK101

* 101 keys American/102 keys European
* XT/AT compatible
* 12 function keys

® MONTEREY

MONTEREY International Corp.

P.O. Box 55 — 850, Taipei, Taiwan, R.O.C. Office: 1-6 F No. 40, Deh Hwei Street, Taipei, Taiwan. Phone: 886-2-5917138. Cable: MONTEREY TAIPEI.
Telex: 25171 MONTEREY. Fax: 886-2-5931075.

guide as to how jargonised the text is.

If you compare the number of uses of words like 'its' and 'their' to words like 'your' and 'yours', you can also produce a rough guide to the personal tone of the text.

This non intelligent phase of the style checking process is all that PC-Style does. It just runs through the text file, prints a table containing the type of figures mentioned above, and returns you to DOS.

The best feature of PC-Style is its speed. If you've just finished the first draft of an article, there's no harm in running it through PC-Style to check the reading age and average sentence length. Reading ages should generally come out around 14 years, while an average sentence length of 18 to 20 words is about right. Some journalists are taught that no sentence must ever be more than nine words, though this is probably more for the readers' benefit.

RightWriter also gives a summary of the document after making its comments. This is more detailed than PC-Style's, because of all the extra information that RightWriter gathers while adding the comments. This will contain messages like: 'Most sentences contain multiple clauses. Try to use more simple sentences.' or 'Most sentences start with nouns. Try varying sentence starts.'

The second task that style checkers perform is to 'examine' the text and suggest ways in which it can be improved. It's important to realise that no program will actually take your text file and automatically correct it according to its own rules. All that the software does is to make suggestions as to how you can tidy up your own work. RightWriter, for example, makes a copy of your text file, into which comments from a repertoire of 32 are inserted at appropriate places. The comments are identified by special characters, such as

<<*LONG SENTENCE: 44 WORDS*>>

so that, once you have taken note, a search and replace session will remove the comments from the file. If you prefer, RightWriter will take out the comments for you.

In use

To put the software to the test, I gave each program a chance to look at some text. The piece in question was the first 1300 words of the PC-Write review which appeared in the March issue of *APC*.

PC-Style scanned the text in just a few seconds and displayed the results on screen and printer. RightWriter took a couple of minutes to produce a commented version of the file, while Grammatik insisted on displaying everything on the screen and asked me to press RETURN after each error it found, before proceeding to the next. This made the checking process that much longer than with the other programs.

With results to hand, the first thing that struck me was the way the programs counted the number of words in the text. According to PC-Style, my file contained 1280 words. RightWriter and Grammatik put the figure at 1295 and 1325 respectively.

A sample PC-Style report is in the screendump. For my sample text, the number of words per sentence came out at just under 19, which is passable. Readability was given as 11.1 years.

RightWriter gives a similar table of figures, though it also includes a count of the number of unique words. This tell you how many different words the text contains. Unless both figures are equal, you have used some words more than once, as would be expected. The number of unique words came out at 484, which is roughly a third of the document's size. Grammatik and RightWriter each had startlingly different things to say about the text, as you can see from the screendumps.

The second sentence is picked up by RightWriter as being too long, at 26 words. Whether you agree is neither here nor there — RightWriter comes preconfigured with the definition of a long sentence fixed at 22 words and you can't change that. Grammatik lets it pass.

In the next paragraph, both Grammatik and RightWriter picked up the punctuation error, where the full stop is after the quotation marks but should really be before.

Of the two programs, RightWriter seemed to be the more thorough. It certainly picked up more errors, though most of these were because of 'long' sentences.

RightWriter picked up 'not impossible', suggesting that it was a double negative and should be rephrased. It also detected a split infinitive. Grammatik seemed to lack intelligence — it just scanned for words like 'very' and 'fairly' and flagged them as being vague.

Only RightWriter counted commas and flagged as unsatisfactory sentences that contained a lot of subordinate clauses.

With regard to summaries, RightWriter gave a readability index of 14 years. PC-Style said 11.1 but Grammatik didn't offer a figure.

RightWriter also said:

STRENGTH INDEX: 0.47

The writing can be made more direct by using:

— the active voice

— shorter sentences

DESCRIPTIVE INDEX: 0.65

The use of adjectives and adverbs is within the normal range.

JARGON INDEX: 0.00

SENTENCE STRUCTURE RECOMMENDATIONS:

1. Most sentences contain multiple clauses. Try to use more simple sentences.

The complete Grammatik summary, printed after the line by line post mortem, consisted of the following short, ungrammatical and badly laid-out information:

sent: 71; # words: 1325
avg sent len: 18.8; avg word len: 4.3
questions: 0;# imperatives: 0
short sent(<14 wds): 22;long sent(>30 wds): 5 longest 46 wds at sent #14; shortest 6 wds at #22 to be's: 49; prepositions: 165

Conclusion

There is no shortage of style analysts available for those who fancy improving their style. And the question must follow: who is really going to use them, and are any of them worth the money. PC-Style costs $13 plus $5 postage but Grammatik at $US89 plus $US20

Details

PC-Style is a Shareware program which costs $18 including postage. It is available from PC-SIG, PO Box W42, West Pennant Hills NSW 2120. Tel: (02) 875 3538.

RightWriter costs $358.80 and is sold here by ICT. Tel: (02) 398 9333. You may also want RightWords which contains a set of jargon dictionaries amd some programs for creating your own.

Grammatik costs $US109 (including postage), and is available from Digital Marketing, PO Box 2010, Walnut Creek, California, 94595, USA. Tel: (415) 947 1000.

SCREENTEST

for postage and RightWriter at $358.80 are not cheap.

As this explanation will have made clear, the 'style' that is being analysed in inevitably grammatical and not truly literary. I have amused myself by running a variety of authors through the three programs, but 'nuance' is lost on these FOG based assessors. Dickens should cut out his lengthy sentences, Orwell can be 'weak', and James Joyce was universally disliked. PG Wodehouse, however, scores every time. Still, the purpose of the programs is not to create masterpieces, merely readable copy. And do they?

At the risk of being Mr Smart-Aleck, I don't think I'll use them. What I do for a living is compile dictionaries of jargon and slang, and write various books, the current ones coming in at around 350,000 words apiece. I've run small examples of my material through all three programs and while they picked out the odd duplicated word, and so on (for which I'm duly grateful), I can't be doing with this endless whingeing on about the passive voice, or the assumption that 22 words makes a sentence long, and a couple of subordinate clauses makes it complex.

The programs remain too simplistic and too dictatorial to be genuinely useful. They may well help those who really find writing a nightmare, yet have to do it, but for many more people, something else is needed.

What that something appears to be is customisation. If one is willing to spend the time to work out the sort of vocabularies one uses most, to amass a list of common personal errors and to put the lot on an accessible file, then these programs can be made much slicker and more pertinent. For instance, if one could put Eric Partridge's *Dictionary of Cliches* on file and then read it into Grammatik or RightWriter you would really be dealing with style and not just grammar. But both programs only accept single words and, more vitally, generating what would in effect be personalised literary expert systems requires dedication and time. It also requires a degree of literary sophistication, and the premise of these programs is that they only exist because that's just the sort of thing the potential user lacks.

Thus, with genuine regret, thumbs down to style analysis from this hack. An idea whose time has certainly come, but not yet one that's really good enough.

END

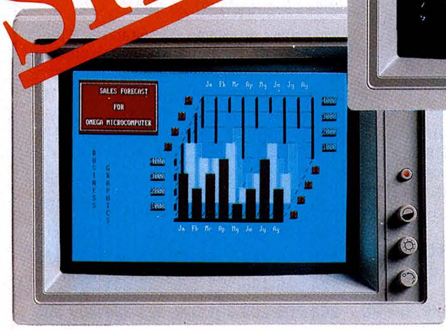
PROTECT THESE FROM

PERMANENT DAMAGE

Following the success of the MD-3 high resolution monitor, TVM has developed a complete family of high resolution, high performance video display monitors designed to satisfy any requirements and any budget.

All TVM monitors come with an impressive list of features including non-glare 14" CRT screen, full X-ray shielding, built-in 90-270 volt AC power regulator, and our unique Multi-Display and Soft-Touch monochrome features, providing customers with a variety of built-in monochrome and full-color viewing modes available at the twist of a knob.

SHOW SPECIALS



KELLER AUTOMATION — Stand No. 464

MD-3 MULTI-DISPLAY
Hi-Resolution RGB Monitor
- Compatible with IBM, APPLE and most other PC systems
- Includes green/amber/full color Multi-Display function

MD-3V MULTI-FUNCTION
RGB Monitor/Receiver
- Multi-purpose "TV-MOUSE" for VTR/TV viewing
- Soft-Touch seven color monochrome & white reverse switch
- MD-3 standard features

MD-7 MULTI-SCAN
Enhanced RGB Monitor
- Compatible with IBM Enhanced Graphics Adapter or equivalent
- Dual mode 15.75 to 21.85 KHz, 640×200 to 720×350 pixels resolution
- Green/amber/16 to 64 colors

MD-8 PROFESSIONAL
Ultra Hi-Res. RGB Monitor
- Compatible with IBM Professional Graphics controller
- RGB Analog/30.48KHz
- 720×480 pixel resolution with 4,096 colors capability
- Soft-Touch seven color selector

MD-24 SIGMA/BOB
Super Hi-Res. RGB Monitor
- Compatible with PERSYST "BoB" card or equivalent
- RGB Intensity/24.83KHz
- 800×400 pixels resolution (non-interlaced)
- Seven color monochrome selector/16 colors

	NORMAL PRICE (inc tax)	SHOW SPECIAL (inc tax)
EM 7570 A	~~$420~~	$295
MD 3	~~$863~~	$645
MD-3V (with TV MOUSE)	~~$1223~~	$895
MD-7 (with EGA+CARD)	~~$1928~~	$1395
MD 24	~~$1434~~	$995
MD 8	~~$1524~~	$1095

SIGMA T.M.
PERSYST "BoB" is a registered trademark of Emulex Corporation.
IBM is a trademark of International Business Machine Corp.
APPLE is a registered trademark of Apple Computer Inc.
TVM is a registered trademark of Taiwan Video & Monitor Corp.

PC PROGRAMMES FOR ONLY $3!

From the thousands of programmes we have collected from public domain and user-supported software we bring you a special selection of the best utilities available – special purpose programmes that you may choose in any combination that you wish.

Choose any number for only $3 each (service charge), with a minimum of five programmes, and we transfer them on to one (or more) of our disks for you.

We include source coding where possible. The programmes are documented, where required. Disks are formatted for MS-DOS 2. or greater. 360 k. Programmes are intended for the IBM-PC or close compatibles.

EFFICIENCY WITH FILES AND COMMANDS

U1. DIRECTORY CONTROL. Returns you to a previous directory whose name it saves.
U2. RAMDISK. Very good ramdisk creator – like a memory-resident disk drive.
U3. WINDOW TOOLS. Mini Sidekick with memory-resident editor, timer, ASCII reference.
U4. FAST DISK. Speeds up activity and processing of many programmes.
U5. FILE MANAGER. Excellent general purpose file manager that copies, deletes, views, etc. Many features.
U6. DIRECTORY LISTER. Creates directory lists for comments. Saves to disk.
U7. DIRECTORY PATHS. Lets programmes write to other directories.
U8. KEYBOARD DEFINER. Redefines keyboard to suit own needs.
U9. SPACE. Shows the amount of free space on disk in thermometer style.
U10. SUPERIOR DIRECTORY Shows disk directory with file attributes which are active. Also sorts by name, date, size, extension. Accurate for hard disk.
U11. BACKED UP. Indicates which hard disk files have not been backed-up.
U12. NEW FILES. Lists files that you created today.
U13. SPEEDKEY. Increase speed of cursor.

FILE PRINTING/EDITING

U101. PRINTER SWAP. Swaps line printer assignments for easier printing.
U102. WORDSTAR CONVERTER. Superior converter of wordstar to ASCII and reverse from document file.
U103. DISK COVER DIRECTORY. Prints directory in size suitable for pasting on disk jacket.
U104. COMMAND EDITOR. Very good editor of operating system commands.
U105. BANNER. Prints wide banners on your printer.
U106. LISTER. Prints documentation, adding page numbers.
U107. PRINT CONTROLLER. Gives extensive control of printer settings – bold, italics, compressed, etc. Epson compatible.
U108. NOT PRINT. Redirects computer output to the screen.
U109. DARKEN. Overstrikes a text file to obtain darker print.
U110. MERGE. Merge sorted files into one sorted file.
U111. TEXT FORMATTER. Processes text files for printing with special features imbedded in output – bold, italics, etc.
U112. SEARCH/REPLACE. Search for and replace characters.
U113. CUT & PASTE. Allows movement of parts of documents between files.
U113. NOTEPAD. Ready at hand notepad. Memory resident.
U114. TEXT INDEX. Indexing for text files. Mark words for listing.
U115. WORDSTAR INDEX. Indexing system for Wordstar.
U116. UNDERLINE STRIPPER. Strip underline from Wordstar files.
U117. KEYBOARD DEFINER. Keyboard redefiner for Wordstar.
U118. WORDSTAR COLOUR. Adds colour to Wordstar.
U119. WORDSTAR NUMBERS. Add and remove numbers to paragraphs in Wordstar files.
U120. WORDSTAR CHARACTERS. Character look-up programme.
U121. EXECUTABLE PATCHES. Standalone Wordstar patches.
U122. WORDSTAR GREEK. Obtain Greek characters in Wordstar documents.
U123. PROGRAMME EDITOR. Editor for programmers, with multiple windows.
U124. TEXT EDITOR. Editor with major commands, without frills.
U125. LAST LINES. Types the last specified number of lines in a file.
U126. FAST LISTING. Fast listing of files by extension.
U127. SQUEEZE LIST. Lists squeezed library files.
U128. COUNT. Counts characters, words, lines, pages in a textfile.
U129. PRINTER PATCHES. Extensive collection of printer patches for wordstar.

FILE LOCATING

U201. SMALL FILE FINDER. Locates files in subdirectories. Small tightly coded.
U203. FILE SEARCH. Memory-resident. Locates files in subdirectories.
U204. CHARACTER SEARCH Searches disk for character or string.
U205. FILE FINDER. Locates and lists files, allows deletion of unwanted files. Act from within programme.
U206. NEW GREP. Matches file patterns. Has 'C' source.

FILE READING/DISPLAY

U301. TEXT READER. Excellent text display utility with many features. Scrolls, reads one page at time, goes to end, beginning, etc.
U302. READ SQUEEZE. Read squeezed files without physically unsqueezing.
U303. READ BACKUPS. Read backup disks of your hard disk. Needs Basic.
U304. TREE DIRECTORY. Displays a tree directory of files, including sub-directories.
U305. TRACK READER. Reads sectors and tracks in hex and ASCII.
U306. BROWSE. Examine files with 4 way scrolling.
U307. DUMP. Gives an ASCII/HEX display of any file.
U308. DIRECTORY READER. Read a directory from or to a certain point.
U309. KEYBOARD BUFFER. Keyboard buffer of 160 characters.
U310. SYSTEM SHELL. Operating system shell that interfaces with Crosstalk, 1-2-3, and Multimate.

EQUIPMENT HANDLING

U401. DRIVE CLEANER. Runs the drive for head cleaning disk.
U402. CORELOOK. Gives memory content in HEX and ASCII.
U403. SCREEN SAVE. Blanks screen if not used for several minutes. Saves screen wear.
U404. DISKPARK. Positions the hard disk head key for safety when travelling or moving computer.
U405. COLOUR CONVERTER. Displays colours as shades of grey.

FILE MOVING

U501. SWEEP. Famous file-handler. Reads, mass copies, deletes, etc.
U502. REDIRECTS output to a disk file.
U503. NIMBLE DISK. Helps you move more easily around a hard disk.
U504. SECTOR RETURN. Recovers deleted first sectors.
U505. SELECTIVE COPYING. Copy programme using menu system.
U506. SELECTIVE DELETION. Programme delete using menu system.
U507. ENHANCED COPYING. Copy several unrelated programmes with the same command.
U508. NEW MOVE. Rename and move programme to another directory without copying.
U509. TOTAL ERASURE. Totally erases disk, including format.
U510. NEW DISKCOPY. Good diskcopy with extra features. Copies whole disk. Sidesteps and signals faulty sectors.

FILE ORGANISATION AND CHECKING.

U601. ARCHIVER. Superior file compressor and library creator.
U602. FILE CORRUPTION. Fast checker for detecting corrupted files.
U603. DISK SQUEEZE/UNSQUEEZE Squeezes and unsqueezes all files on a disk.
U604. PROTECT/UNPROTECT. Avoids accidental erasure of important files..
U605. SECRET FILES. Make, go to, or remove a secret directory.
U606. SQUEEZE/UNSQUEEZE. Compresses files to save space. Also uncompresses.
U607. LIBRARY CREATOR. Combines files into libraries. Adds to, deletes, extracts files.
U608. LIBRARY DISPLAY. Displays the directory of a library. Related to above programme.
U609. NEW NAME. Changes volume name of a disk.
U610. FILE COMPARISON. Intelligent file comparison programme which detects differences between files.

SPECIAL FEATURES

U701. CALENDAR. Display of any month or year.
U702. NEW DATE. Changes date of file entry in disk directory.
U703. BYTE CONVERTER. Converts all bytes to 2 byte (7 bit) for serial transfer.
U704. COMPILING AID. Simplifies, automates compiling and linking.
U705. ALARM. Sets time for alarm to sound.
U706. NEW TIME. Sets system time and clock.
U707. DOS HELP. Assistance with dos commands displayed on screen.
U708. GET TIME. Simplifies getting time and date.
U709. CLOCK. Shows time on screen while you work.
U710. CALCULATOR. Memory-resident for convenient access.

FILE ALTERATION/RECOVERY/REPAIR

U801. FILE RECOVERY. Retrieves a programme you have just erased.
U802. DEBUG TIPS. Tips on using debugging programme effectively.
U803. DISK PATCHER. Reads and patches disk contents. Altering files, repairing corruptions, allowing unerase and creating files from memory.
U804. LOCK/UNLOCK. Protects files from unauthorised access with simple encrypting technique.

ORDERS:

The service charge for each programme is $3. There is a minimum charge of $15 (five programmes). Add 20% Sales Tax plus $3 for postage and packaging. ORDERS MUST BE PREPAID.

PAYMENT BY MAIL TO:
SELECT SOFTWARE, Box C343,
Clarence St, PO, Sydney NSW 2000
(Office: 3 Barrack St., Sydney, NSW)

TELEPHONE ORDERS:
Pay by Bankcard, Mastercard or Visa.
(02) 29 2866, (02) 29 3810.

We cannot guarantee the suitability of programmes for users needs or equipment.

CIRCLE NUMBERS BELOW AND SEND TO US WITH PAYMENT AND YOUR NAME AND ADDRESS. OR TELEPHONE US WITH THE PARTICULARS. SEE ABOVE.

1	2	3	4	5	6	7	8	9
10	11	12	13	101	102	103	104	105
106	107	108	109	110	111	112	113	114
115	116	117	118	119	120	121	122	123
124	125	126	127	128	129	201	202	203
204	205	206	301	302	303	304	305	306
307	308	309	310	401	402	403	404	405
501	502	503	504	505	506	507	508	509
510	601	602	603	604	605	606	607	608
609	610	701	702	703	704	705	706	707
708	709	710	801	802	803	804		

DEALER ENQUIRIES INVITED

HERE'S PROOF!

Samsung is tops

Korea's largest computer manufacturer, now proves its superiority. Just compare the data in the chart below.

Feature-Wise Price-Wise Samsung is the best!

Model	RRP (ex Tax)	Tilt Swivel Base Inc.	Anti-Glare Screen Inc.	New Look Flat Screen	Video Band Width	Scan Freq.	Operat-ing Temp.	Weight	Hidden Front Cont.	Heavy Duty Cabinet	Active Display Area
SAMSUNG GR2F	$225.00	✓	✓	✓	20 Mhz	18.432 Khz	−10°C to +50°C	8.1 kg	✓	✓	210 mm x 160 mm
TAXAN KX1212	$335.00	✗	✓	✗	20 Mhz	18.432 Khz	−10°C to +40°C	6.8 kg	✗	✗	205 mm x 150 mm
ROLAND MA-122	$262.50	✗	✓	✓	20 Mhz	18.432 Khz	0°C to +40°C	7.0 kg	✗	✗	195 mm x 146 mm
QUBIE HR39	$320.00	✓	✓	✗	20 Mhz	18.432 Khz	−10°C to +50°C	9.8 kg	✗	✗	204 mm x 135 mm

For all your computer needs, we're a must.

AMust

350 South Road, Moorabbin, Victoria 3189. (03) 555 3644.

Proven Japanese Quality Control

Samsung has been working together with NEC since 1977, and with the strictest Japanese quality control, they're rapidly becoming Australia's number one monitor. Small wonder, with a price 20% below that of their nearest competitor.

IBM Compatibility

There are a number of models to choose from in a choice of flat, anti-glare screen with tilt and swivel base or standard screen. Most models come in either green or amber screen and are compatible with IBM, Apple and most types of computers.

Australia's Sole Distributor

Call Amust — Australia's sole distributor for the Dealer closest to you,
in NSW or ACT
Castle Technology Holdings
Suite 1, 682 Old Castel Hill Rd
Castle Hill (02) 634 5111

Branching out

In the final part of his series on Prolog programming, Mike Liardet implements some of the language's more advanced built-in predicates in a natural-language database.

In the previous articles in this series (*APC*, March-May) I have covered all the major constructs of Prolog; clauses, structures, constants and lists, and so on. I have also covered a number of the simple built-in predicates (Prolog's name for 'library' facilities), such as those used for input and output, and arithmetic.

In this final article I'll introduce some further built-in predicates which can be extremely useful for advanced applications, and then use then in a system for processing natural language 'database' queries. In addition, I'll show you how Prolog programs can be speeded up by helping them to know when they can stop doing one job and move on to another.

Remember that all the example programs accompanying this article are written in Turbo Prolog and may need some modification before they will work with other versions of the language. Most notably, the declarations at the top of each example (everything up to and including the word 'clauses') should be omitted when using other Prologs.

Any readers who are unfamiliar with the Prolog terminology used here are advised to refer to the previous articles, and especially to the first one, 'Prolog power' (*APC*, March).

Advanced built-in predicates

Prolog's advanced built-in predicates have a number of purposes. For example, they are used in 'meta-programming' (that is: writing programs which manipulate programs); controlling the execution of clauses; and modifying the syntax of the Prolog language itself.

Some Prologs (Turbo included) also have windowing, graphics, file handling and sound predicates, and so on. Although these facilities can be extremely useful, I won't be covering them here because they are no more difficult to comprehend in Prolog than they would be in any other language.

It should be noted that Turbo Prolog has a more limited range of advanced predicates than other Prologs — in part a price that is paid for its speed of

execution. Turbo Prolog offers no opportunities for modifying the syntax of the language, and has weaker meta-programming facilities. Because of these omissions I'll concentrate primarily on Turbo's 'control' facilities, which are the same as in other Prologs. These facilities are called 'cut', 'fail', and 'not'. I'll conclude this section with a brief overview of other Prologs' advanced built-in predicates which are not present in Turbo.

When the 'cut' predicate is used as a goal in a clause, it affects the flow of control as the clause is executed but is completely invisible in every other respect. The 'cut' predicate is represented by the symbol '!' in most Prologs. It takes no arguments so there is no need for any parentheses to follow it. It is usually used to make programs run more efficiently by allowing for the removal of redundant testing, and it also enables Prolog to handle logical negation.

To demonstrate the value of the 'cut' predicate, first type in the program in Fig 1. This program calculates the number of prime numbers up to and including 500. The program does not use the 'cut' predicate, and I'll show how, with just a few 'cuts' and some small changes, we can make it run considerably more efficiently.

The 'goals' statement in the program causes a beep to be sounded immediately before and after the main goal in the program is solved. This means that, when you run it, you can time on a stopwatch how long this goal takes to solve. On my fairly pedestrian PC, the main goal took about 31 seconds to be solved. In other PCs the figure could be quite different: but make a note of the time taken, whatever it is. (The answer to the problem should be 95, meaning that there are 95 prime numbers up to and including 500.)

Before showing how the performance of this program can be improved upon, I'll give a brief overview of how it works. The 'num_primes_up_to' predicate considers all the numbers from the number given in the first argument right down to 1. It tests whether or not each of these numbers is prime, and adds one to the total if it is. As, by convention, 1 and 0 are not considered to be prime, the first clause states that there are no primes 'up to' and including 1. The 'is_prime' predicate is defined by a single clause which merely reverses the result of 'has_divisor', meaning that a number is prime if it does not have a divisor. When it is invoked, the 'has_divisor' predicate has to be given a lowest possible number to start testing for divisors, and this is 2. It carries on testing with bigger and bigger numbers until it reaches the square root of the number under test; and if no divisor has been found before then, there will be no divisors at all, 'has_divisor' fails and the number is prime.

```
predicates
    num_primes_up_to(integer,integer)
    is_prime(integer)
    has_divisor(integer,integer,integer)

goal
    beep,
    num_primes_up_to(500,N),
    beep,
    write(N),nl.

clauses

num_primes_up_to(N,0):-
    N <= 1.
num_primes_up_to(N,Ans):-
    N > 1,
    is_prime(N),
    N1 = N - 1,
    num_primes_up_to(N1,Ans1),
    Ans = Ans1 + 1.
num_primes_up_to(N,Ans):-
    N > 1,
    not(is_prime(N)),
    N1 = N - 1,
    num_primes_up_to(N1,Ans).

is_prime(N):-
    not(has_divisor(N,2,_)).

/* has_divisor(N,Low,X): N has a divisor X >= Low */
has_divisor(N,Low,Low):-
    Low <= sqrt(N),
    0 = N mod Low.
has_divisor(N,Low,X):-
    Low <= sqrt(N),
    0 >< N mod Low,
    Low1 = Low + 1,
    has_divisor(N,Low1,X).
```

Fig 1 Primes program without any 'cut' predicates

```
clauses

num_primes_up_to(N,0):-
    N <= 1,
    !.
num_primes_up_to(N,Ans):-
/*  N > 1, */
    is_prime(N),
    !,
    N1 = N - 1,
    num_primes_up_to(N1,Ans1),
    Ans = Ans1 + 1.
num_primes_up_to(N,Ans):-
/*  N > 1, */
/*  not(is_prime(N)), */
    N1 = N - 1,
    num_primes_up_to(N1,Ans).

is_prime(N):-
    not(has_divisor(N,2,_)).

/* has_divisor(N,Low,X): N has a divisor X >= Low */
has_divisor(N,Low,_):-
    Low > sqrt(N),
    !,
    fail.
has_divisor(N,Low,Low):-
/*  Low <= sqrt(N), */
    0 = N mod Low,
    !.
has_divisor(N,Low,X):-
/*  Low <= sqrt(N), */
/*  0 >< N mod Low, */
    Low1 = Low + 1,
    has_divisor(N,Low1,X).
```

Fig 2 Modifications to the Primes program, introducing the 'cut' predicate

To fit a publisher, artist, designer, typesetter, editor and printer on your desk...

Now, there is a solution to the new world of desktop publishing within the IBM PC environment.

It's called scLASERplus, and is an evolutionary desktop publishing software package which goes right to work with your IBM PC, HP Vectra, or other IBM compatibles, plus Hewlett-Packard LaserJet Series 11 printer.

Not only can you integrate word processing text and graphics with the wide range of formatting capabilities, but you have the choice of an extensive selection of fonts and functions. This allows you to go far beyond the limitations of conventional page layout programs and expertly handle large-scale document production.

..use this

scLASERplus is specifically designed to handle lengthy documents that combine text, tables, graphs and charts, such as business reports or presentations.

That's why scLASERplus is the most complete PC-based professional desktop publishing system available today.

And you don't have to be a computer graduate to use it.

ACA•Pacific
Technology Pty Ltd

HEWLETT PACKARD | COMPUTER PRODUCTS | INDEPENDENT SOFTWARE VENDOR

102 Glover Street,
Cremorne, NSW, 2090
Tel: (02) 909 1988

dd626

What does Blue Chip mean to Americans?

The hottest selling personal computer ever launched.

What does Blue Chip mean to Australians?

An emerging professional chain of retail outlets selling what will be the hottest personal computer in Australia.

BLUE CHIP

BLUE CHIP PERSONAL COMPUTER PACKAGES

- **BLUE CHIP A2** As per the A1 with 2 floppy disk drives — **$1195** inc tax
- **BLUE CHIP A3** As per the A1 with 5 MB hard disk — **$1395** inc tax
- **BLUE CHIP A4** As per the A1 with 10 MB hard disk — **$1595** inc tax
- **BLUE CHIP A5** As per the A1 with 20 MB hard disk — **$1855** inc tax

- Add $50 for 640 KB RAM
- Add $200 for Turbo option
- Add $100 for hi-res monographic monitor and card
- Add $350 for color monitor

ENHANCE YOUR BLUE CHIP

- **BLUE CHIP A1** 1 × 360K floppy disk drive, 256 KB RAM, color display card, multi-function card, XT style keyboard, green or amber monitor. — **$995** inc tax

OPENING SPECIAL

BLUE CHIP A3 SYSTEM

with F60 printer and cable, 500 sheets of paper, 10 floppy diskettes, disk storage box, mouse and desqview software

$1950 inc tax

SUPER SAVINGS

	Ex tax $	Incl. Tax $
Lotus 123	565	649
Wordstar 2000+	399	459
dBase III+	795	914
Easy Extra	199	228
Symphony	890	1023
Multiplan	295	339
Word	595	684
Multimate 3.6	695	799
Word Perfect	515	592
First Choice	215	247
Wordstar 4	415	477
Framework II	885	1017
Javelin	599	689
Jet	100	115
Microsoft Windows	155	178
Norton Utilities	125	144
Sidekick	50	58
Desqview	50	58
Ability	215	247
Microsoft mouse	279	320
Genius mouse	149	172
Ast. 6 Pack Card	199	229
Turbo Prolog	119	137
Turbo Pascal	90	104
Turbo Tutor	49	57
Database Toolbox	85	98
Editor Toolbox	85	98
Graphic Toolbox	85	98
Game Works	55	64

A CHIP OFF THE OLD BLOCK

COBURG
328 Sydney Rd
383 5655

DANDENONG
92 Thomas St
794 0966

RINGWOOD
8 Railway Place
870 2243

Opening soon near you

Notice that there are a number of redundant tests in the program. For example, the comparison of N and 1 is performed in each 'num_primes_up_to' clause, and the 'is_prime' test is performed twice (once within a 'not'). There are also redundancies in the 'has_divisor' clauses.

Having timed the program in Fig 1, refer to Fig 2 to modify the clauses, as shown. The goal and predicates information remains unchanged, and so has been omitted from Fig 2. One or two goals have been commented out and a new 'has_divisor' clause has been added, along with a few 'cuts'. Save the modified program under a different name so that both versions will be preserved, and then run the new program. On my PC, the modifed program took 13 seconds, performing at about 2.5 times the speed of the first program.

'. . . there is considerable scope for improving and extending the program . . .'

The difference in speed is totally due to the use of 'cut', which allows all the redundant tests to be removed. (It would also be possible to improve performance with a more efficient algorithm, but we are concerned with 'cut' here, not with an optimum problem solution.)

How 'cut' works

When a 'cut' is executed as a goal in a clause, it always succeeds, but it suppresses all backtracking with any of the earlier goals in that clause, and also with alternative clauses for that predicate. For example, consider the solution of three different goals:

num_primes_up_to(1,X) (1)
num_primes_up_to(2,X) (2)
num_primes_up_to(4,X) (3)

Try these goals out as command-line goals if you wish. Remember that they are each to be tried in isolation: there is, of course, no X which will solve the three together.

Goal (1) is solved by the first 'num_primes_up_to' clause, with a cut executed as the last goal in the clause. This means that, in the event of backtracking being needed, the system will look at no alternative ways of showing the previous goal, 'N < = 1' (there are none anyway), and will ignore the two following clauses. Thus, quite correctly,

```
domains
    found = found_that(symbol,symbol,symbol)
    foundlist = found*
    symlist = symbol*

predicates
    person(symbol,symbol,symbol,symbol)
    offspring(symbol,symbol,symlist)
    age(symbol,symbol)
    sex(symbol,symbol)
    name(symbol,symbol)
    worth(symbol,symbol)
    ignore(symlist)
    synonyms(symbol,symlist)
    parent(symbol,symbol)
    grandparent(symbol,symbol)
    greatgrandparent(symbol,symbol)
    mother(symbol,symbol)
    father(symbol,symbol)
    son(symbol,symbol)
    daughter(symbol,symbol)
    brother(symbol,symbol)
    sister(symbol,symbol)
    grandfather(symbol,symbol)
    grandmother(symbol,symbol)
    grandson(symbol,symbol)
    granddaughter(symbol,symbol)
    cousin(symbol,symbol)
    uncle(symbol,symbol)
    aunt(symbol,symbol)
    person_enquire(symbol,symbol,symbol)
    attr_enquire(symbol,symbol,symbol)
    identify_somebody(symlist,symlist,symbol)
    identify_somebody1(symlist,symlist,symbol,symbol)
    identify_everybody(symlist,symlist,symlist)
    filter(symlist,symlist)
    member(symbol,symlist)
    empty(symlist)
    query(symlist)
    get_values(symlist,foundlist)
    no_repeats(symlist,symlist)
    lookup(symbol,symlist,foundlist)

clauses
```

Fig 3 The preamble for the natural language/database system. This is not required in other versions of Prolog

```
/* handle a query X */
query(X):-
    write(X),nl,
    filter(X,Fx),
    get_values(Fx,Answers),
    write(Answers),nl.

/* process the filtered text to get the result(s) */
get_values(Text,Answers):-
    identify_everybody(Text,[],Persons),
    no_repeats(Persons,Ps),
    lookup(name,Ps,Answers).
get_values([Attrib|Rest],Answers):-
    identify_everybody(Rest,[],Persons),
    no_repeats(Persons,Ps),
    lookup(Attrib,Ps,Answers).
get_values(Text,Answers):-
    identify_everybody(Text,[apos,Attrib],Persons),
    no_repeats(Persons,Ps),
    lookup(Attrib,Ps,Answers).
get_values(Text,Answers):-
    identify_everybody(Text,[Attrib],Persons),
    no_repeats(Persons,Ps),
    lookup(Attrib,Ps,Answers).

/* identify a person from the supplied text.
eg the aunt of the daughter of John' son 's cousin... */
identify_somebody([Person|Rest],Text_after,Person_identified):-
    person(Person,_,_,_),
    identify_somebody1(Rest,Text_after,Person,Person_identified).
identify_somebody([Reln|Rest],Text_after,Person_identified):-
    identify_somebody(Rest,Text_after,Other_person),
    person_enquire(Reln,Other_person,Person_identified).
identify_somebody([Reln|Rest],Rest,Person_identified):-
    person_enquire(Reln,_,Person_identified).

/* handle the apostrophes when identifying somebody
eg John son's cousin... */
```

```
identify_somebody1([apos, Reln¦Rest],Text_after,Person_before,
      Person_identified):-
    person_enquire(Reln,Person_before,Other_person),
    identify_somebody1(Rest,Text_after,Other_Person,Person_identified).
identify_somebody1(Text,Text,Person,Person).

/* get everybody (at least one person) query might be referring to */
identify_everybody(Text_before,Text_after,Persons):-
    findall(Person,identify_somebody(Text_before,Text_after,Person)
      ,Persons),
    not(empty(Persons)).

/* dictionary: words to ignore and synonyms */

ignore([which,please,tell,me,who,what,how,much,is,are,the,a,an,of,
        all,does,have,has,somebody]).
synonyms(age,[age,old,ages]).
synonyms(sex,[sex,sexes]).
synonyms(name,[name,names,called]).
synonyms(father,[father,fathers,dad,dads]).
synonyms(mother,[mother,mothers,mum,mums]).
synonyms(worth,[wealth,money,cash,lucre,loot]).
synonyms(grandparent,[grandparent,grandparents]).

/* filter out words to be ignored and substitute synonyms */
filter([Word¦Words],Fwords):-
    ignore(Iwords),
    member(Word,Iwords),
    !,
    filter(Words,Fwords).
filter([Word¦Words],[Sword¦Fwords]):-
    synonyms(Sword,Syns),
    member(Word,Syns),
    !,
    filter(Words,Fwords).
filter([Word¦Words],[Word¦Fwords]):-
    filter(Words,Fwords).
filter([],[]).
```

Fig 4 The language processing predicates

```
/* specifies the name, age, sex, and assets of each person */
person(mike,"68",male,"100000").
person(susan,"66",female,"500000").
person(fred,"55",male,"10000").
person(elaine,"50",female,"20000").
person(john,"27",male,"200").
person(mary,"30",female,"30000").
person(paul,"2",male,"1000").
person(tom,"4",male,"7500").
person(tim,"44",male,"3000").
person(bessy,"44",female,"200000").
person(avril,"26",female,"8000").

/* the marriages and children */
offspring(john,mary,[paul,tom]).
offspring(fred,elaine,[john]).
offspring(mike,susan,[elaine,tim]).
offspring(bessy,tim,[avril]).

/* calculation of the various family relationships */
parent(Child,Par):-
    offspring(Par,_,Kids),
    member(Child,Kids).
parent(Child,Par):-
    offspring(_,Par,Kids),
    member(Child,Kids).
grandparent(Child,Gpar):-
    parent(Par,Gpar),
    parent(Child,Par).
greatgrandparent(Child,GGpar):-
    grandparent(Par,GGpar),
    parent(Child,Par).
mother(Child,Mum):-
    parent(Child,Mum),
    person(Mum,_,female,_).
father(Child,Dad):-
    parent(Child,Dad),
    person(Dad,_,male,_).
son(Par,Son):-
    parent(Son,Par),
    person(Son,_,male,_).
daughter(Par,Daughter):-
    parent(Daughter,Par),
    person(Daughter,_,female,_).
brother(Either,Male):-
    mother(Male,Par),
```

it will only ever use the first clause for solving goal (1).

Goal (2) is not solved by the first clause because the 'N < = 1' test fails. The 'cut' in the first clause is never reached, so the second clause is tried. This clause can assume that 'N > 1'; there is no need to test this because from the failure of the first clause, we know that N is *not* <= 1 (that is: N is > 1). How can we be sure there was a failure in the first clause? If it had succeeded, the cut would have been executed and backtracking to this second clause would have been suppressed. Therefore, it is impossible to reach the second clause if the first succeeds. In the second clause, the 'cut' follows the 'is_prime' goal. This suppresses any backtracking (alternative ways to show the number is prime) and the use of the third clause.

Goal (3) is solved by the third 'num_primes_up_to' clause. The first clause fails on the 'N < = 1' test and

'Turbo Prolog has a more limited range of advanced predicates than other Prologs . . . a price that is paid for in its speed of execution.'

the second clause fails on the 'is_prime(N)' goal. Because of the two earlier 'cuts', if the third clause is used, then it must be the case that N is not <= 1 and N is not prime, so the 'N > 1' and 'not(is_prime(N))' tests are unnecessary in the third clause.

The 'has_divisor' clauses use the 'cut' in a very similar way to remove redundant tests, but in Fig 2, an extra clause precedes the two in Fig 1. This causes 'has_divisor' to fail if the second argument (Low) is greater than the square root of the first. After the test, the 'cut' suppresses backtracking and the 'fail' guarantees failure. The 'fail' predicate is the simplest Prolog predicate there is, since it is defined by no clauses whatsoever! Thus, in most Prologs, any unused predicate name would do instead of 'fail', but Turbo Prolog complains about undefined predicates if the word 'fail' is not used.

Turbo Prolog has a few other advanced built-in predicates. For example: 'findall', which is used in the natural-language example (see below); and some 'database' predicates which enable programs, while they are running, to dynamically create and remove

008 335757 TOLL FREE MAILORDER HOTLINE FOR CREDIT CARD ORDERS!!

ROD IRVING ELECTRONICS HAVE THE CHEAPEST DISKS IN AUSTRALIA!!

Now you can buy absolute top quality disks that are also the cheapest in Australia! They even come with a 5 year guarantee, which indicates the quality of these disks. So why pay 2-3 times the price for the same quality?

CHECK THESE PRICES!

DESCRIPTION	1-9 BOXES	10+ BOXES	100+ BOXES
5¼" S/S D/D	$14.95	$13.95	$12.95
5¼" D/S D/D	$17.95	$16.95	$15.95

(SEND $2 FOR SAMPLE DISK!)

5¼" D/S "NO FRILLS" DISKS FROM 90¢ EACH!!

Bulked packed, Microdot D/S D/D without boxes, or brand name, just their white card jacket!

10-99 DISKS	100+DISKS	1,000+DISKS	5,000+DISKS
$1.20ea	$1.10ea	$1.00ea	$0.90ea

(SEND $2 FOR SAMPLE DISK!)
(TAX EXEMPT PRICES LESS 20¢ PER DISK)

3½" "NO FRILLS" DISKS!

D/S D/D disks with white boxes, but no brand name. (These are a top name brand, but we can't tell you which.)

10-99 DISKS	100+DISKS	1,000+DISKS
$42.50 (PER 10 DISKS)	$39.95 (PER 10 DISKS)	$35.00 (PER 10 DISKS)

(SEND $5 FOR SAMPLE DISK!)
(TAX EXEMPT PRICES LESS 40¢ PER DISK)

VERBATIM 5¼" HIGH DENSITY DISKS!

Rod Irving Electronics have made an unbelievable price break through on High Density Verbatim disks! And you're the one who benefits!

1-9 BOXES	10+BOXES	100+BOXES
$59.95 (PER 10 DISKS)	$49.95 (PER 10 DISKS)	$47.50 (PER 10 DISKS)

IBM* XT COMPATIBLE COMPUTERS from $795*

Check these features and our prices. We're sure you'll agree they're exceptional value for money!

- **Assembled in Australia!**
- **Tested by us for 24 hours prior to delivery!**
- **150W power supply**
- **AT style keyboard**
- **Operating manual**
- **8 Slot motherboard**
- **6 Months warranty!**

(Japanese drives available for an extra $50 each)
(4.77/8MHz Turbo Motherboard with Soft/Hard switch, available for an extra $50)

*$795 COMPATIBLE COMPUTER

256K RAM Single Drive, Graphics and Disk Controller Card **$795**

256K RAM COMPATIBLE COMPUTER

2 x 360K Disk Drives, Multifunction Card,(which has Disk Controller, Clock/Calender including Timer disk, 2 Serial Ports, 1 Parallel Port and 1 Games Port) and your choice of Colour Graphics Card or Monochrome Graphics Card. **$1,095**

640K RAM COMPATIBLE COMPUTER

2 x 360K Disk Drives, Multifunction Card,(which has Disk Controller, Clock/Calender including Timer disk, 2 Serial Ports, 1 Parallel Port and 1 Games Port) and your choice of Colour Graphics Card or Monochrome Graphics Card. ..... **only $1,195**

20 M/BYTE HARD DISK COMPATIBLE COMPUTER

20 M/Byte Hard Disk, 360K Disk Drive(s), 640K RAM, Multifunction Card, (which has Disk Controller, Clock/Calender including Timer disk, 2 Serial Ports, 1 Parallel Port and 1 Games Port) and your choice of Colour Graphics Card or Monochrome Graphics Card.

Single 360K Floppy Disk Drive .... **only $1,850**
Dual 360K Floppy Disk Drives .... **only $1,995**

IBM* AT COMPATIBLE

Assembled & Tested in Australia!

- 1 M/Byte Main Board
- 1.2 M/Byte Floppy Disk Drive
- Colour Graphics Display Card
- Floppy & Hard Disk Controller Card
- Printer Card and RS232
- 200W Power Supply
- 6 Months Warranty
- 6 MHz
- 80286 CPU
- 8 Slots
- 20 M/Byte Hard Disk
- Keyboard
- Manual

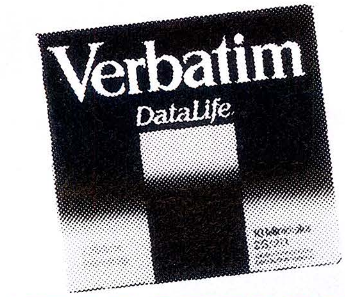
.... **only $2,975**

RETAIL INQUIRIES: Rod Irving Electronics,
MELBOURNE, 48 A'Beckett St. Phone (03) 663 6151
NORTHCOTE 425 High St. Phone (03) 489 8866
MAIL ORDER: (03) 543 7877 or P.O. Box 620, CLAYTON 3168

WHOLESALE INQUIRIES: Ritronics Wholesale, 56 Renver Rd. CLAYTON 3168. Phone (03) 543 2166

Errors and omissions excepted
*Apple and IBM are registered trade names

008 335757 TOLL FREE MAILORDER HOTLINE FOR CREDIT CARD ORDERS!!
008 335757 TOLL FREE MAILORDER HOTLINE FOR CREDIT CARD ORDERS!!



VERBATIM DISK SPECIALS!

All prices 10 disk boxes!

Description	1-9 boxes	10+boxes
5¼" S/S D/D	$27.95	$26.95
5¼" D/S D/D	$34.95	$32.95
5¼" D/S 80 track ..	$75.00	$70.00
5¼" High Density	$59.95	$49.95
3½" S/S D/D	$54.95	$49.95
3½" D/S D/D	$59.95	$55.95

RS232 INLINE SWITCHING BOX

- 25 pin "D" plug to 25 pin "D" socket
- DIP switches allow easy switching of internal wiring.

Cat. X15662 .... **$32.95**

CENTRONICS GENDER CHANGERS

- Female to Female.
- Saves modifying or replacing non-mating Centronics cables.
- All 36 pins wired straight through.

Cat. X15663 **Male to Male**
Cat. X15661 **Male to Female**
Cat. X15664 **Female to Female**

Normally $33.95,
Only $24.95

SAVE $5

RS232 GENDER CHANGERS

- Saves modifying or replacing non-mating RS232 cables.
- All 25 pins wired straight through

Cat. X15650 **Male to Male**
Cat. X15651 **Male to Female**
Cat. X15652 **Female to Female**

Normally $19.95 each
Only $14.95

SAVE $6

RS232 MINI JUMPER PATCH BOXES

- Interface RS232 devices
- 25 pin inputs
- 25 leads with tinned end supplied
- Complete with instructions

Cat. X15653 **Male to Male**
Cat. X15654 **Female to Male**
Cat. X15655 **Female to Female**

Normally $25.95
Only $19.95

SAVE $8

RS232 WIRING ADAPTOR BOX

- Male to female
- 25 Detachable plug on leads
- 2 mini jumpers
- Ideal for experimenting or temporary connections

Cat. X15665 ...... **Normally $49.95**
Only $44.95

MAIL ORDER HOTLINE
008 335757
(TOLL FREE)
LOCAL: 543 7877

SAVE $7

RS232C NULL MODEM ADAPTOR

- Male to female connections
- Pins 2 and 3 reversed
- All 25 pins connected

Cat. X15657 **Male to Male**
Cat. X15658 **Male to Female**
Cat. X15659 **Female to Female**

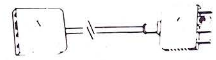
Normally $22.95
Only $14.95

RS232 MINI TESTER

- Male to female connections
- All pin wired straight through
- Dual colour LED indicates activity and direction on 7 lines
- No batteries or power required

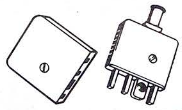
T.D. Transmit Data
D.S.R. Data Set Ready
R.D. Receive Data
C.D. Carrier Detect
R.T.S. Request To Send
D.T.R. Data Terminal Ready
C.T.S. Clear to Send

Cat. X15656 ...... **Normally $39.95**
Only $29.95



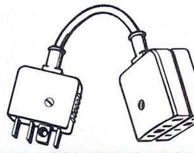
TELECOMMUNICATION EXTENSION LEADS

Cat.Y16010 5 metre **$12.50**
Cat.Y16012 10 metre **$14.95**



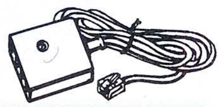
TELECOMMUNICATION PLUG/SOCKET

Plug Cat. Y16016 .... **$3.95**
Socket Cat. Y16018 .... **$4.95**



TELECOMMUNICATION PLUG TO 2 SOCKETS.

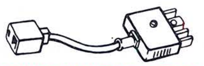
Ideal for modem connections.
Cat. Y16014 .... **$12.95**



TELECOMMUNICATIONS AUSTRALIAN TO U.S. ADAPTOR CABLE

- Australian socket to U.S plug.
- Length 5 metres.

Cat. Y16017 .... **$7.95**



TELEPHONE ADAPTOR

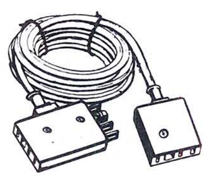
- Australian plug to U.S. socket
- Length 10cm

Cat. Y16026 .... **$5.95**

TELEPHONE CURL CORD

- U.S. plug to U.S. plug
- Replacement hand set cord
- Length 4.5 metres

Cat. Y16023 .... **$6.95**



TELECOMMUNICATIONS AUSTRALIAN STYLE ADAPTOR CABLE

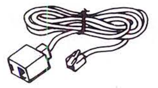
- Australian socket to plug/socket
- Length 10 metres

Cat. Y16015 .... **$14.95**

TELEPHONE EXTENSION CABLE UNIT

Allows 15 metres of telephone extension cable to be neatly wound into a protable storage container. The reel sits on a flat base and has a handle to wind cable back on to it after use. No tangles - no mess! Ideal for the workshop, around the house, office, pool etc.

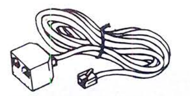
Cat. Y16013 .... **$22.95**



U.S. TELEPHONE EXTENSION CABLE

- U.S. plug to U.S. socket
- Length 10 metres

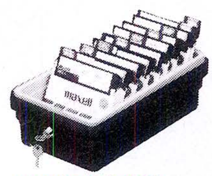
Cat. Y16024 .... **$7.95**



U.S. TELEPHONE EXTENSION CABLE

- U.S. plug to 2 U.S. sockets
- Length 10 metres

Cat. Y16028 .... **$9.95**



JUMBO 5¼" DISK STORAGE

If you've got lots disks, you'll appreciate the extra capacity of this disk storage unit when it comes to locating "that" disk!

Features...

- 100 disk capacity
- Smoked plastic cover
- Lockable (2 keys supplied)
- 9 Dividers/spacers

C16020 .... **only $24.95**
C16027 (Hinged Lid) **$26.95**

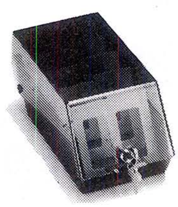
5¼" DISK STORAGE

Efficient and practical. Protect your disks from being damaged or lost!

Features...

- 70 disk capacity
- Smoked plastic cover
- Lockable (2 keys supplied)
- Dividers/spacers

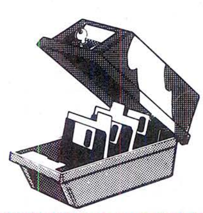
Cat. C16025 .... **only $19.95**



3½" DISK STORAGE UNIT

- Holds up to 40 x 3½" diskettes.
- Lockable (2 keys supplied)
- High impact plastic lid and base
- Anti static

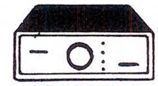
Cat. C16040 .... **only $19.95**



3½" DISK STORAGE UNIT

- Holds up to 40 x 3½" diskettes.
- Lockable (2 keys supplied)
- High impact plastic lid and base

Cat. C16035 .... **only $19.95**



2 & 4 WAY RS232 DATA TRANSFER SWITCHES

If you have two or four compatible devices that need to share a third or fifth, then these inexpensive data transfer switches will save you the time and hassle of constantly changing cables and leads around.

- No power required
- Speed and code transparent
- Two/Four position rotary switch on front panel
- Three/Five interface connections on rear panel
- Switch comes standard with female connector

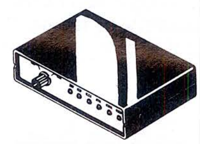
2 WAY Cat.X19120 ~~$125~~ **$95**
4 WAY Cat.X19125 ~~$145~~ **$119**

2 & 4 WAY CENTRONICS DATA TRANSFER SWITCHES

Save time and hassles of constantly changing cables and leads around with these inexpensive data transfer switches. These data switches support the 36 pin centronic interface used by Centronics, Printronics, Data Products, Epson, Micronics, Star, and many other printer manufacturers.

- No power required
- Speed and code transparent
- Two/Four position rotary switch on front panel
- Three/Five interface connections on rear panel
- Switch comes standard with female connector
- Bale locks are standard

2 WAY Cat.X19130 ~~$125~~ **$95**
4 WAY Cat.X19135 ~~$145~~ **$119**



RS232 DATA SWITCH WITH TESTER

- No power required
- Ideal for 1 computer to 2 peripherals or 2 computers to one peripheral.
- 25 pin RS232 "D" connectors.
- Six dual coloured LED indicators showing certain flow status:

T.D. Transmit Data
R.D. Receive Data
R.T.S. Request To Send
C.T.S. Slear To Send
D.S.R. Data Set Ready
D.T.R. Data Terminal Ready

- Size: 200(W) x 68(H) x 150(D)mm

Cat.X19110 .... **R.R.P. $169**
Our Price $149

SAVE

SEMICONDUCTORS!

Always check our prices before you buy!

	1-9	10+	100+
2716	$9.95	$9.50	$8.95
2732	$8.95	$8.50	$7.95
2764	$7.95	$7.50	$6.95
27128	$6.95	$6.50	$6.25
27256	$11.50	$10.50	$10.00
27512	$19.50	$18.50	$17.50
4116	$3.95	$3.50	$2.95
4164	$2.25	$1.95	$1.75
41256	$6.95	$6.50	$5.95
555 8pin	$0.50	$0.40	$0.35
6116	$3.95	$3.75	$3.50
6264	$6.50	$6.00	$5.75
6802	$5.00	$4.00	$3.75
6821	$2.00	$1.80	$1.70
6845	$5.00	$4.00	$3.75
7406	$0.40	$0.30	$0.25
INS8250	$29.95	$27.95	

NE5534AN

SCOOP PURCHASE!!!

1-9	10+	100+
$1.95	$1.85	$1.75

WORLD MODEM CHIP

Cat. U21614 .... Normally $49.50
Save $25, SPECIAL $24.95

MEL9501

Have you blown up your Apple drive by plugging it in backwards or not turning off the power while changing boards? We have the MEL9501 chip!

SPECIAL, ONLY $29.95

8087

Genuine Intel chips with manual and data sheets packed in boxes!

8087-3 (4.77MHz)	**$269**
8087-2 (8MHz)	**$385**
8087-1 (10MHz)	**$585**
80287-3 (6MHz)	**$475**
80287-7 (8MHz)	**$679**

UV EPROM ERASER

Erase your EPROMs quickly and safely. This unit is the cost effective solution to your problems. It will erase up to 9 x 24 pin devices in complete safety, in about 40 minutes (less for less chips).

Features include:

- Chip drawer has conductive foam pad
- Mains powered
- High UV intensity at chip surface ensures EPROMs are thoroughly erased
- Engineered to prevent UV exposure
- Dimensions 217 x 80 x 68mm

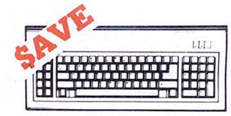
WITHOUT TIMER

Cat. X14950 .... **Normally $119**
Special, $89

WITH BUILT-IN TIMER

Cat. X14955 .... **$139**
Special, $119

SAVE



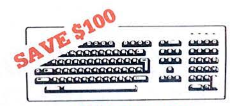
"IBM* AT COMPATIBLE" KEYBOARD

- 100% IBM* PC, XT compatible
- Low profile keyboard design
- Proper placement of shift keys with large key tops to suit professional typists.
- 3 step height/angle adjustment
- Cherry brand TS-M00001 19mm low profile switches, meet 30mm ergonomic requirement and provides high performance and maximum reliability.
- Curl lead plugs straight into PC/XT
- 3 Status displays

Just like the "Real McCoy" only at a fraction of the price!

Cat.X12020 .... **only $129**

SAVE $100

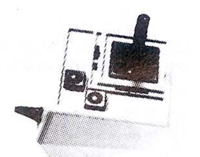


IBM* XT & AT COMPATIBLE EXTENDED KEYBOARD (105 KEYS)

These new keyboards are both XT and AT compatible!

- 20 Dedicated function keys
- Enlarged "Return" and "Shift" key
- Positive feel keys
- Low Profile Design, DIN standard
- Separate Numeric and Cursor control keypads
- Additional Functions... Key-in-lock, Audio Beep, Previous Word, Next Work, Fast Repeat, Line Feed, Pause, Clear Screen, Reset.

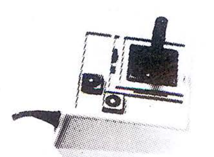
Cat.X12022 .... **WAS $299**
SPECIAL, ONLY $199



APPLE* II SERIES COMPATIBLE JOYSTICK

These joysticks have adaptor connectors to suit the Apple II, IIc, IIe and II+ computers. Features include selectable "spring centring" or "free floating". Electrical trim adjustments on both axis, 360° cursor control and dual fire buttons

Cat. C14201 .... **$49.95**



JOYSTICK FOR IBM

Features Selectable "Spring centering" or "free floating". Electrical trim adjustments on both axis. 360 degree cursor control

Cat. C14205 .... **$49.95**

'fact' clauses. Other Prologs have all the Turbo Prolog facilities I have mentioned above, and a great many more besides. Their 'database' predicates can create and delete general clauses, not just fact clauses. They can also convert between lists and structures. Another useful facility they provide is for structures to be 'declared' as operators, which allows for more readable programs — for example, 'john is_the_father_of tom' instead of 'father_of(tom,john)'. All these facilities can be very useful in advanced applications, and it is unfortunate that Turbo Prolog lacks them. Undoubtedly, one reason for their omission is that they are extremely difficult to implement in an efficient compiled system like Turbo Prolog, and this is one of the penalties to be paid for its performance.

```
        mother(Either,Par),
        Male >< Either,
        person(Male,_,male,_).
    sister(Either,Female):-
        mother(Female,Par),
        mother(Either,Par),
        Female >< Either,
        person(Female,_,female,_).
    grandfather(Child,Gdad):-
        grandparent(Child,Gdad),
        person(Gdad,_,male,_).
    grandmother(Child,Gmum):-
        grandparent(Child,Gmum),
        person(Gmum,_,female,_).
    grandson(Gpar,Gson):-
        grandparent(Gson,Gpar),
        person(Gson,_,male,_).
    granddaughter(Gpar,Gdaughter):-
        grandparent(Gdaughter,Gpar),
        person(Gdaughter,_,female,_).
    cousin(X,Y):-
        grandmother(X,Gpar),
        grandmother(Y,Gpar),
        mother(X,Par1),
        mother(Y,Par2),
        Par1 >< Par2.
    uncle(Child,Unc):- /* blood uncle and aunt only */
        brother(Par,Unc),
        parent(Child,Par).
    aunt(Child,Aunt):-
        sister(Par,Aunt),
        parent(Child,Par).

    /* access of the various attributes of a person */
    age(Person,Age):-
        person(Person,Age,_,_).
    sex(Person,Sex):-
        person(Person,_,Sex,_).
    name(Person,Person):-
        person(Person,_,_,_).
    worth(Person,Worth):-
        person(Person,_,_,Worth).
```

Fig 5 The database and database processing predicates

```
/* person_enquire(Relation Person Person) effectively allows a variable
predicate call for people */
person_enquire(parent,X,Y):-parent(X,Y).
person_enquire(grandparent,X,Y):-grandparent(X,Y).
person_enquire(greatgrandparent,X,Y):-greatgrandparent(X,Y).
person_enquire(mother,X,Y):-mother(X,Y).
person_enquire(father,X,Y):-father(X,Y).
person_enquire(son,X,Y):-son(X,Y).
person_enquire(daughter,X,Y):-daughter(X,Y).
person_enquire(brother,X,Y):-brother(X,Y).
person_enquire(sister,X,Y):-sister(X,Y).
person_enquire(grandfather,X,Y):-grandfather(X,Y).
person_enquire(grandmother,X,Y):-grandmother(X,Y).
person_enquire(grandson,X,Y):-grandson(X,Y).
person_enquire(cousin,X,Y):-cousin(X,Y).
person_enquire(uncle,X,Y):-uncle(X,Y).
person_enquire(aunt,X,Y):-aunt(X,Y).
person_enquire(brother,X,Y):-brother(X,Y).

/* attr_enquire(Attribute Person Value) effectively allows a variable
predicate call for people's details */
attr_enquire(age,X,Y):-age(X,Y).
attr_enquire(sex,X,Y):-sex(X,Y).
attr_enquire(name,X,Y):-name(X,Y).
attr_enquire(worth,X,Y):-worth(X,Y).

/* test for the empty list */
empty([]).

/* list membership */
member(X,[X|_]).
member(X,[_|Y]):- member(X,Y).

/* removes repetitions from a list */
no_repeats([X|Y],NY):-
```

A natural-language database system

Prolog is an ideal programming language for implementing natural-language understanding systems and for handling intelligent databases. In this section I'll show the language at work on both these programs together.

The system described here operates on a 'database', actually consisting of a number of fact clauses about people, their ages, financial positions, and their marriages and offspring. From these basic facts in the database it can derive their family relationships — that is, who are the grandparents and uncles, and so on. It can then process English enquiries about the family members, and answer questions like:

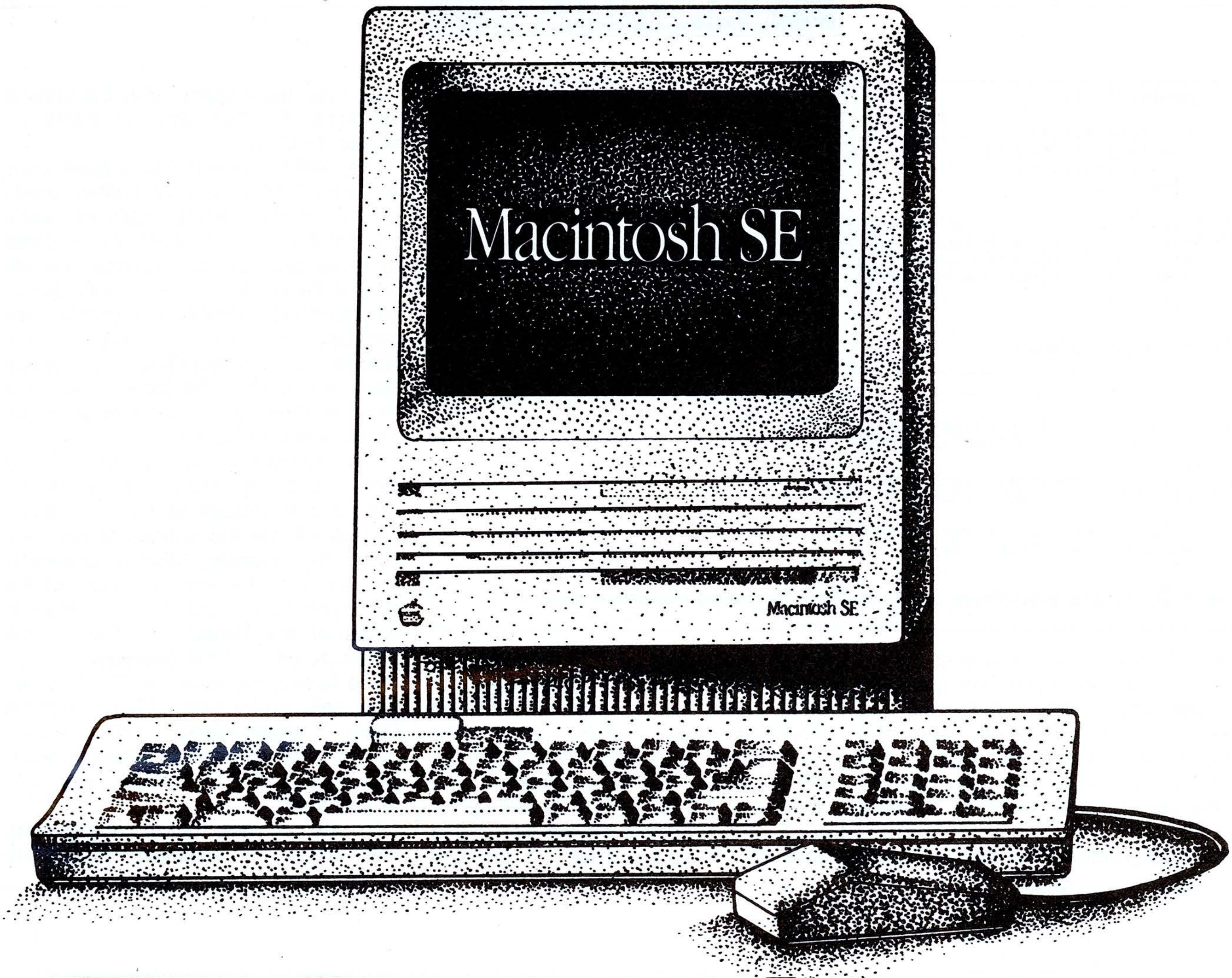
How old are John's grandparents?
Who is the aunt of Avril?

As with any natural-language system there is considerable scope for improving and extending the program, and I'll make a number of suggestions as to where this can be done.

The complete program is given in Figs 3-6 (non-Turbo Prologers can omit the declarations of Fig 3). When the program has been entered, from the command goal prompt it can respond to queries, as shown in Fig 7. Notice that the queries must all be set up in comma-delimited lists and without capitalising names (otherwise they will be mistaken for variables). The 's' sequence has to be entered as 'apos' instead. The program's text manipulation facilities could be greatly improved by recourse to string manipulation facilities, and you are invited to do this.

With the aid of the comments it should not be too difficult to understand most of the individual predicate definitions, so I'll just present an overview of the system here, starting with Fig 4.

The top-level clause in the system is the 'query' clause. This takes the list of English words, prints it to the screen, then gets rid of all superfluous words and substitutes any synonyms (using



Trade up to the new Mac SE for only $2,595!*

The new generation Macs have arrived, and the changes are more than cosmetic.

The new Macintosh SE is so fast that even the Mac Plus looks slow in comparison.

Other features on the Mac SE include:

- Twin internal 800K floppy disk drives
- Optional internal 20meg hard disk drive
- 1 Meg of RAM, expandable to 4 Meg
- 256K ROM. Twice that of the Mac Plus for improved system performance
- Expansion slot allows you to customize with products such as accelerator or MS DOS coprocessor cards.
- Choice of two new larger keyboards
- Seven built-in ports that support Appletalk; up to seven high-speed SCSI peripherals; and up to 16 Apple Desktop Bus Devices.

Apple doesn't have a trade-in policy but we do.

We'll find a caring new home for your old Mac and give you a new Mac SE in return.

Check the following table for your changeover investment:

*with approved trade-in

Trade-in your old Mac ...	Get a new ... Mac SE Twin Floppies	Mac SE 20 Meg H/Disk
Plus	$2,595	$3,950
512K/800	$2,895	$4,395
512K	$3,150	$4,650
512K(Up/g)	$3,250	$4,750
128K	$3,495	$4,980

Phone now for more information
Give us a call now on (03) 794 8990.
Your new SE is eagerly awaiting.

Robs Computer Centre
Cnr Thomas & Scott Sts, Dandenong, 3175
Phone (03) 794 8990

AdShop/Rob 215

```
    member(X,Y),
    !,
    no_repeats(Y,NY).
no_repeats([X|Y],[X|NY]):-
    no_repeats(Y,NY).
no_repeats([],[]).

/* looks up a particular attribute for a list of people */
lookup(Attrib,[Person|Persons],[found_that(Attrib,Person,Ans)|Answers]):-
    attr_enquire(Attrib,Person,Ans),
    lookup(Attrib,Persons,Answers).
lookup(_,[],[]).
```

Fig 6 Utility predicates

```
Goal: query([how much,is,paul,apos,grandfather,worth]).
[found_that("worth","fred","10000")]

Goal: query([what,sex,is,avril,cousin]).
[found_that("sex","john:,"male")]

Goal: query([how,old,is,the,father,of,avril,apos,aunt]).
[found_that("age","mike",68)]
```

Fig 7 Query and responses to the natural-language database system

'filter'). It then uses whatever words are left to actually make the query (in the 'get_values' goal). Assuming the query can be answered, then the answers are displayed. Notice that there can be more than one answer, so the result of the query is returned as a list.

The 'get_values' clauses evaluate who is/are being referred to, and what particular attribute is of interest. In some cases the same person may be identified more than once, so 'no_repeats' is used to ensure that the list of people has no repetitions. The specified attribute is then looked up for each of the people on the list (using 'lookup'). In some cases no attribute may have been specified in the original sentence, in which case the 'name' attribute is looked up.

The 'identify_everybody' clause uses a Turbo Prolog special built-in predicate — 'findall'. 'findall' calls the 'identify_somebody' goal repeatedly in order to assemble all the possible people who fit the bill onto a list. If nobody can be identified, 'identify_everybody' fails because of the 'not-empty' test. Nobody will be identified if a relation does not exist in the family tree, or if there is some grammatical error or unknown word encountered.

The dictionary of synonyms and words to be ignored could be greatly extended to include all the pet names and plurals for the various family relations (for example, 'aunts', 'grandpa', and so on). The first argument of the synonyms predicate is the 'internal' name of the relation — that is, the predicate used in the database.

The family 'database' in Fig 5 is largely self explanatory. Many possible family relationships have been omitted (for example, in-laws, nieces, and so on), and the reader may care to add them.

To add a new family relationship, first create its definition along the

NOW! For something completely different....

SMALLTALK/V $199

Smalltalk/V is an ideal tool for solving both simple and complex problems on a personal computer. It is currently in use by scientists,engineers, students, teachers and professionals, both for research and other users have chosen Smalltalk/V because of its unique qualities: it is easy to learn, yet offers an unsurpassed array of tools for solving problems in a variety of fields, and is powerful enough to serve as a delivery vehicle for real-world applications - all on an IBM PC or compatible!!

SMALLTALK/V FEATURES

*500 Page manual with 10 chapter tutorial and language reference sections.
*10 useful starter applications are included.
*A user-extendable, open-ended environment.
*A responsive graphical user interface.
*Supports exploratory programming and prototyping.
*Class hierarchy with inheritance creates highly re-useable code.
*Smalltalk source code included, with browser windows for easy access and modification.
*A huge toolkit of classes and ovjects for building a variety of applications.
*Bit-mapped graphics with bit and form editors.
*A sophisticated source level debugger.
*Object-swapping creates virtual memory on gard or RAM disk.
*Automatic change log for easy recovery from errors.
*Powerful directory/file browser system for organizing DOS files.
*Includes object-oriented Prolog intergrated with the Smalltalk environment.
*Access to other language and DOS functions.

EGA COLOUR EXTENSION KIT $90

The EGA colour extension kit integrates full EGA colour capabilities with Smalltalk/V's environment, greatly enhancing the system's already extensive bit-mapped graphics capabilities, and therefore enhancing your ability to create interfaces that communicate complex information simply graphically.

COMMUNICATIONS EXTENSION KIT $90

Four communication windows are provided: a UNIX browser window, a TTY window, a BIX browser window and a BIX reader window. The Unix browser window gives you the Smalltalk/V mouse and menu driver interface to a remote UNIX system. You can browse the remote file/directory hierarchy with the disk browser window.
The Bix browser window is used for all on-line access to Bix and the Bix reader window is used for organizing, reading and replying to messages off-line.

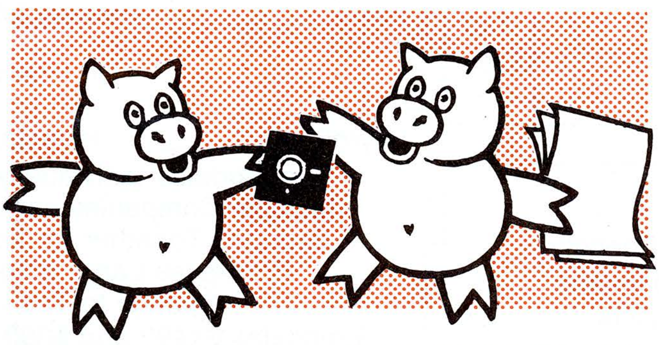
"GOODIES" EXTENSION KIT $90

The "Goodies" extension kit offers a number of new capabilities that allow you to extend the Smalltalk/V environment to handle applications that require discrete event simulation, forward-chaining inference operations, or connection to external sensors an instrumentation.

MULTIPROCESSING, ZOOM, DOS CALL, MUSIC, OBJECT LOADER, FORWARD CHAINING INFERENCE ENGINE.

CATALOGUE

Software Express has produced a catalogue in similar vein to this add. This should provide a handy reference for professionals in the computer area. To obtain this catalogue simply send your business card or $1.00 to the address below. We also have a good range of review and technical notes on software packages. Simply write for photo copies. (within reason)



DAN BRICKLIN'S DEMO PROGRAM $199

Dan Bricklin's Demo Program (called DEMO from here on) is a prototyping program. It is a developer's productivity tool. With DEMO you can conceptualize programs, describe them to others, refine their functionality and human interface,a nd finally, teach users the finished product. It is designed to be used not only by software writers, but also by documentation writers, graphic designers, product managers and other non-programmers. One important application is for users to show developers how they really want a program to appear. That way, DEMO can be used as an important part of the specification of a new product, both on micros and larger computers. Additionally, DEMO can be useful for mocking up part of a program during the development process (top get the spacing, characters, etc., decided before committing them to code).

QC INTERPRETER $120

A GREAT WAY TO LEARN C

QC consists of four parts, the SHELL, the interpreter, the editor, and the debugger. These four parts are combined into a single program that provides an interactive software development environment with extensive on-line help the the programmer.

DATALIGHT C COMPILER $189

The DATALIGHT C COMPILER is a full-implementation of the C language as defined in the C programming language by Kernighan and Ritchie. Supporting five memory models, Datalight C has very fast compile, link,and execution times with a minimum of memory required. Our special introductory price is only $189 for the DEVELOPER'S KIT.

Concise Documentation Included

The DATALIGHT C COMPILER and DEVELOPER'S KIT include a concise, to the point, 210-page programmers manual.

SOFTWARE Express

48 A'Beckett St, MELBOURNE 3000
Phone (03) 663 6580
Mail Orders Welcome

A C interpreter is an effective tool for the software developer. Individual functions can be coded and tested using the interactive interpreter. As you check them out, they are saved away to be integrated into your software system with a compiler and linker when the many parts of the system are completed.

TRANSLISP $175

An Economical Learning Environment

TransLISP is designed to let you venture into LISP. Whether you have years of experience programming in another language or have just taken your computer out of its box, TransLISP will teach you the language preferred by "Artificial Intelligence" researchers with a minimum of effort. And you will learn where and how to apply LISP's power.
TransLISP conforms to the emerging standard in the industry, COMMON LISP. TransLISP is a large subset of COMMON LISP; its 300+ primitives provide power and flexibility similar to much more expensive LISP implementations. Programs you write with TransLISP will be "portable" to a wide variety of LISP environments, including those on DEC and IBM mainframes.
TransLISP provides you with a custom-written Tutorial that gives a complete, step-by-step crash course in LISP and a set of sophisticated sample programs that show you how LISP is used to simulate "intelligent" behavior. Seasoned programmers will appreciate being able to skip the Turtorial and start programming in LISP immediately.

SPF/PC MAINFRAME EDITOR FOR PC's $399

SPF/PC is the PC version of the popular mainframe text editor, ISPF, Interactive Systems Productivity Facility. In addition to the editor, SPF/PC includes a communications program, SPFCOMM, for communication with other computers either by direct link or Hayes modem.

Large file editing on a PC is a reality with SPF/PC's virtual memory feature. Files up to the capacity of the computer's memory, whether hard disk or expanded/-extended memory, may be edited with ease.

And SPC/PC works faster than the mainframe. In a speed test between an IBM 3081 mainframe and an IBM AT (equipped with an extended memory board), SPF/PC searched a 1,500,000 byte file in just 13 seconds while the mainframe took 48 seconds (normal workload).

BRIEF $399

BRIEF is a sophisticated text editor used to enter and modify progams and data. Becuase of its streamlined structure, many text operations can be performed with just one keystroke.

BRIEF can edit any program or data file that is stored in ASCII file format. BRIEF is more flexible than a word processor, while it allows you to perform many of the same funcitons. BREIF's key features include: Full screen editing and cursor movement. On-Line Help. Simultaneous editing of multiple files or different parts of the same file. Undo command to repair mistakes. Easily remembered one- or two- keystorke commands. Block move and copy, both within and between files. Extremely powerful search and translate commands. Keystroke memory to simplify repetitive tasks. A powerful, programmable macro facility to customize and extend BRIEF.

lines of the clauses shown. Then add an extra clause to the 'person_enquire' clauses in Fig 6, and also set up any synonyms (Fig 4) that could be alternative names for the relationship when it appears in enquiries.

It is surprisingly easy to get the definitions of family relationships wrong. For example, without the 'Male > < Either' test in 'brother', the 'brother' predicate would find that someone could be a brother of himself! A good way to test a new definition is to execute a definition directly as a command line goal with only variables as arguments. This finds everyone in the family to whom that relationship could apply, and if you have drawn a family tree, it is easy to spot if the definition is missing anyone or finding too many people. Ideally, each solution it finds should be unique.

It is also very easy to set up an alternative family tree, possibly with your own relatives. Notice that the numeric values in the 'person' fact clauses are given in quotes. This means that internally they are treated as symbols and not numbers, and this simplifies the Turbo Prolog declarations — try removing the quotes if you don't believe me. Make sure that all individuals in the family are represented by different names, otherwise the results of queries may appear to be somewhat incestuous!

Both the 'enquire' utility predicates, defined in Fig 6, could be greatly abbreviated in other Prologs. All they do is convert their three arguments into a goal to be solved. The only way to do this in Turbo Prolog is with a clause for each case to be handled; in other Prologs, a single clause could handle all the cases.

'When you have done all this, you will just about have developed a genuine, practical system!'

Further exercises

For the enterprising reader, there are a number of major extensions that could be attempted. It would be an interesting exercise to extend the system to handle maximum and minimum-type enquiries (youngest brother, richest auntie, and so on).

The information held on each person could be made more elaborate, with addresses, phone numbers and birthdays. Also, an ability to handle 'I' and 'my' would be useful (for example, my uncle, my money). And finally, if you really want to enter a minefield, try to handle the word 'and' in all its connotations. When you have done all this, you will just about have developed a genuine, practical system!

END

Last month's homework

Last month's homework was to write some programs to sort lists of integers. There are numerous sorting algorithms (see, for example, nearly 400 pages in *The Art of Computer Programming: Sorting and Searching*, DE Knuth, Addison-Wesley 1973), and here I'll present the Prolog implementation of just two — Insertion Sorting and Quicksort.

The goals statement below includes provision for timing the different sort methods, but on the short lists given the execution is virtually instantaneous. Use longer lists to obtain more meaningful comparisons.

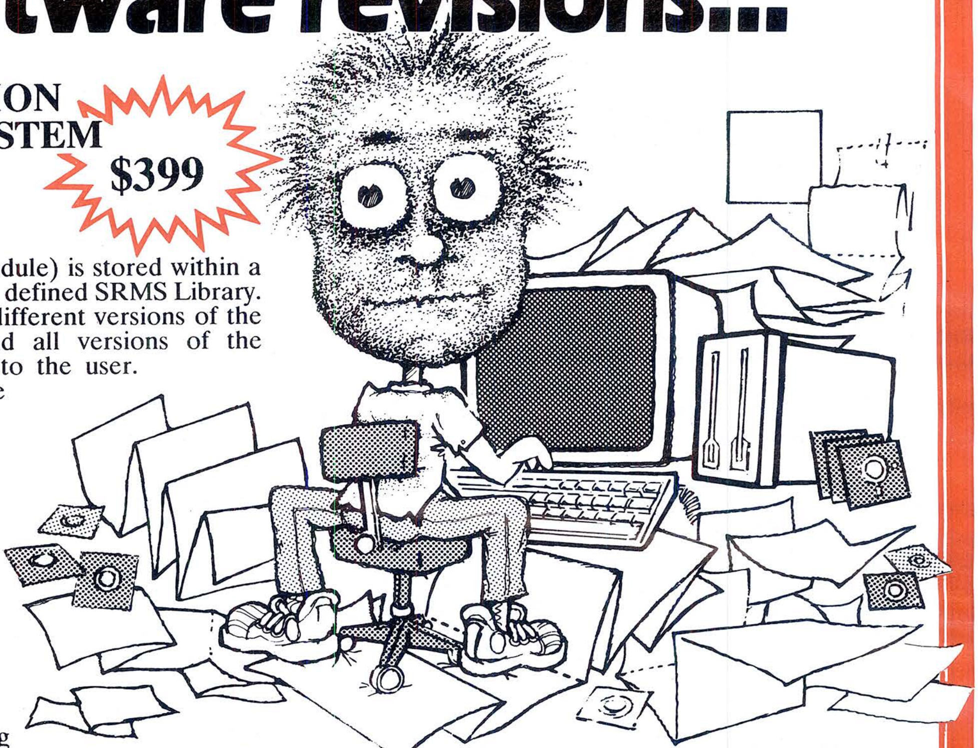
It is also interesting to experiment with the order of clauses for each predicate, and to perform optimisations with the 'cut' predicate (introduced in this article) to see how the timings are affected.

```
domains
     integerlist =integer*

predicates
     insert_sort(integerlist,integerlist)
     insert(integer,integerlist,integerlist)
     qsort(integerlist,integerlist,integerlist)
     partition(integerlist,integer,integerlist,integerlist)
     elapsed_secs(real)

goal
     time(0,0,0,0),
     insert_sort([3,7,1,12,5,3,19],Ans1),
     elapsed_secs(Insert_sort_time),
     write(Ans1),nl,write(Insert_sort_time),nl,
     time(0,0,0,0),
     qsort([3,7,1,12,5,3,19],Ans2,[]),
     elapsed_secs(Qsort_time),
     write(Ans2),nl,write(Qsort_time),nl.


clauses
    /* Insertion sorting */
    insert_sort([],[]).
    insert_sort([X],[X]).
    insert_sort([X|Xs],XXssorted):-
         insert_sort(Xs,Xssorted),
         insert(X,Xssorted,XXssorted).

    insert(X,[],[X]).
    insert(X,[Y|Ys],[X,Y|Ys]):-
         X <= Y.
    insert(X,[Y|Ys],[Y|XYs]):-
         X > Y,
         insert(X,Ys,XYs).


    /* Quicksort */
    qsort([X|Y],Z1,Z2):-
         partition(Y,X,Y1,Y2),
         qsort(Y2,Z3,Z2),
         qsort(Y1,Z1,[X|Z3]).
    qsort([],X,X).

    partition([X|Z],Y,[X|Z1],Z2):-
         X < Y,
         partition(Z,Y,Z1,Z2).
    partition([X|Z],Y,Z1,[X|Z2]):-
         X >= Y,
         partition(Z,Y,Z1,Z2).
    partition([],_,[],[]).

    elapsed_secs(X):-
         time(Hrs,Mins,Secs,Huns),
         X = (Hrs * 60 + Mins) * 60 + Secs + Huns/100.

    ----------
```

When you're up to your neck in software revisions...

SOFTWARE REVISION MANAGEMENT SYSTEM (VERSION 3.0)

$399



MAJOR FEATURES

Every version of a program (module) is stored within a single ASCII file in the currently defined SRMS Library. Any source that is common to different versions of the program is not duplicated and all versions of the program are totally accessible to the user.

Support for any type of source file, including **FORTRAN, BASIC, COBOL, PASCAL, C and ASSEMBLY LANGUAGE** is provided.

SRMS can be used in interactive OR batch environments. All modules in a **SRMS** Library are stored **WRITE PROTECTED** to prevent against accidental deletion or overwriting. Each version of a module in the library is assigned a Version identification String. This string provides information as to the Release, Version and the Date/Time this version was created. This information is added automatically by **SRMS** when a module is inserted into the library and updated when new delta's are applied to the library. The user can specify any number of comments to be associated with each version to aid in the documentation process. These comments become a permanent part of the module histroy. History (audit) reports can be generated based on major releases, specific release/version combinations, date-/time of delta's or all histroy records providing invaluable project management tools. Any version of a program can be restored easily and quickly, in its entirety, with a single command. **SRMS** allows you to continue to use your current editors, compilers, linkers, etc.

THE PROBLEM

During the development cycle of a computer program, or series of programs, many changes are made to the source code. Additions, deletions, and corrections all constitute a significant investment in time on the developers part.

Traditional methods for managing these changes are cumbersome, and in fact, present their own problems. The physical storage space required to store every version of a program quickly becomes prohibitive.

All changes made to a program may not be recorded and documented.

Changes made to one particular version of a program may not be carried over into other versions.

It quickly becomes difficult to keep track of what changed, when it changed, and why it changed.

Documentation describing changes made to the source code is difficult to maintain, and may not exist at all.

Several programmers working on the some project may make conflicting changes to the same program without knowing it.

These problems compound themselves if multiple versions of a system need to be supported. The manual bookkeeping methods needed to keep track of all versions of all modules belonging to Beta, Production, and Test releases of a system quickly become impractical.

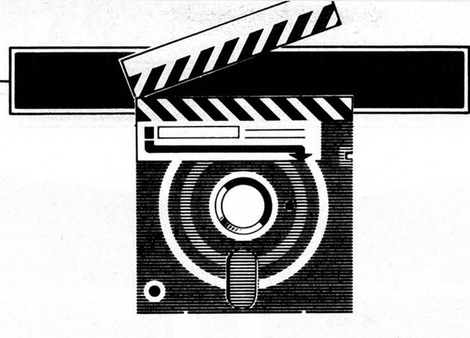
The **Software Revision Management System (SRMS)** is a set of intergrated utilities specifically aimed at solving these problems. All source code associated with a particular system is kept in a single DOS subdirectory. This subdirectory becomes the **SRMS** library, with each source program constituting a module in that library. Each version of the source constitutes a new version for that module in the library, with the number of versions in a particular library module corresponding to the number of revisions made to the source since its creation.

SOFTWARE Express

48 A'Beckett St, MELBOURNE 3000

Phone (03) 663 6580

Mail Orders Welcome



Silk

Lotus 1-2-3's domination of the spreadsheet market has never been seriously threatened, but Daybreak Technologies' Silk provides the same — and more — facilities. Mike Liardet checks out the comparisons.

When, nearly four years ago, Lotus' 1-2-3 integrated spreadsheet system was launched (reviewed by me in *APC*, December 1983), it was widely regarded as the most impressive PC software product that had ever been seen. But four years is a long time in the PC software world, and more than long enough to reduce the extraordinary to the commonplace. In spite of this, to this very day, Lotus has maintained a 1-2-3 stranglehold on the spreadsheet market, and has preserved its high prices while only marginally improving the product.

Not surprisingly, a number of companies have recently been looking enviously at Lotus' dominant position, judging that with falling software prices and much bigger markets they can easily produce a substitute product at a fraction of the price. This has led to a number of 1-2-3 clones, two of which (VP Planner and The Twin) have recently been the subject of some controversy because Lotus believes they are cloning too close for comfort and is seeking to remedy this in the courts. All this controversy has overshadowed the fact that The Twin and VP Planner are not the only substitutes for 1-2-3, and in this article I'll look at another one — Silk.

Silk is the product of Daybreak Technologies, a hitherto unknown US company. It is supposedly the result of '40 person-years' of development effort, which is about four times the original 1-2-3 development effort, if the figure is to be believed. Not only can Silk read and write 1-2-3 work files, but it can perform many of the usual 1-2-3 tasks, and it even operates in much the same way, with a very similar command structure.

Silk also has a handful of extra facilities, not available in 1-2-3, and for the few users who really need them, these may be reason enough to overcome their prejudice against a new product from an unknown company. But the main attraction for most users must be that Silk is about a third of the price of 1-2-3, at $149 in the US. Also, it does not have the inconvenience of Lotus' copy-protection schemes.

Assuming it really lives up to its claims, it is likely that Silk will be of interest to two categories of users: the corporate user currently locked into 1-2-3, but who would prefer to avoid Lotus' prices; and the new breed of budget PC owners who need a powerful spreadsheet system but simply cannot afford almost to double their overall expenditure to buy one. Clearly, corporate users in particular will be very concerned about close compatibility with 1-2-3, expecting that both staff and their models can be transferred to the new system with barely a hiccup.

In this review I'll take a close look at Silk and evaluate just how compatible it is with 1-2-3 (Release 2). I'll also be comparing Silk's performance to that of its more expensive rival. Daybreak Technologies claims that Silk is three times faster than 'the most popular spreadsheet', and I'll be checking the validity of this statement.

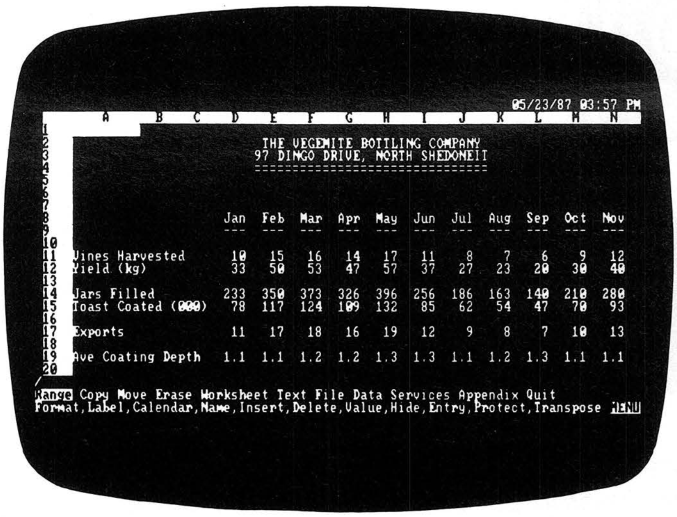
Overview

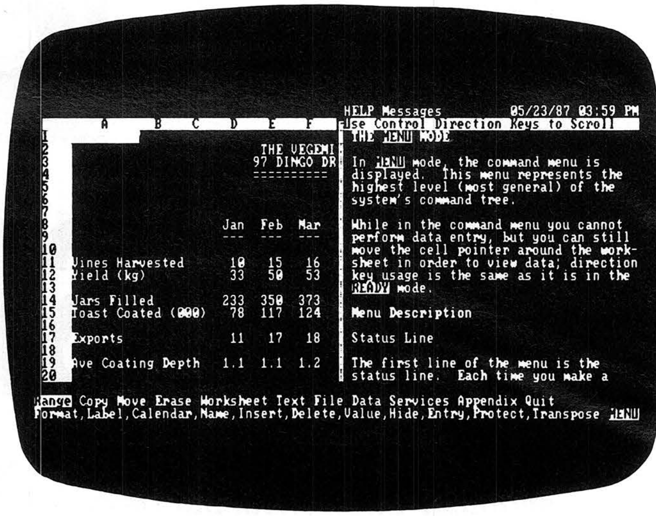
Silk is first and foremost a spreadsheet system, and this places it as one of a vast range of PC software products which are designed to be applied mainly to financial planning and mathematical modelling problems. Like all spreadsheets, Silk can generally be of value in any situation where repetitive calculations and recalculations are being made, with budgeting being the most obvious use for it.

Like 1-2-3, Silk is more than just a simple spreadsheet system. Alongside some very sophisticated spreadsheet facilities, it also offers extensive business graphics options and a macro facility which enables it, in effect, to be driven by a program embedded in the spreadsheet itself. These spreadsheet, graphics and macro facilities it has in common with 1-2-3, but of course, 1-2-3 also has extensive database facilities. Although not all spreadsheet users actually need a database facility, this is a major omission in Silk, which does not offer anything to match in this department.

Although it is obviously aimed at existing 1-2-3 users, Daybreak Technologies has not faithfully followed every last nuance of 1-2-3 in the design of Silk (possibly to protect itself from legal action by Lotus). For example, the menu command structure is slightly different; also, some of 1-2-3's more complicated menu interactions are handled rather better in Silk by 'form' displays.

Silk also contains a few innovations and enhancements over 1-2-3: a goal-seeking option, key-stroke logging, and advanced interactive online help. In the manual, these and other facilities are referred to as 'advanced features', but they are given rather more prominence than they deserve. It should not be con-





The help only covers half the screen, so you can see your worksheet at the same time as the help information

Silk's layout is pretty standard, with a command line at the bottom, and cells identified by column letter and row number

cluded that none of them exists in 1-2-3. For example, circular reference detection is mentioned, and this is available in 1-2-3. Naturally, Silk's advanced features, unique or not, do have their uses and I'll cover them later, but they are not hugely significant and most users will be more concerned with other aspects of the product.

Getting started

Silk is supplied as a manual and five disks, the disks containing the Silk software itself, some utilities, a tutorial, a print graph disk, and an extensive file of 'help' text. The software can run on the IBM PC, XT and AT, and 'all 100 per cent compatibles'. Although Silk can be used on smaller systems, to get the best out of it a hard disk is required and at least 640k of memory. 'Power users' will also undoubtedly require extra expansion memory (they can use up to 8Mbytes) and a numeric co-processor. The review system was not the final release, but a very late 'beta test' version with a draft of the manual.

Assuming a hard disk is available, the software can simply be installed by creating a 'Silk' sub-directory and copying all floppy disks into the sub-directory. The complete system, with all support files, requires about 1Mbyte of disk space. The system can also be run from a twin-floppy system, but this may involve occasional disk swapping. Unlike 1-2-3 there are no problems with copy-protection schemes, although the software is, of course, only licensed for a single user and should only be used on a single PC.

There are a number of programs supplied with the system, and these can each be run directly from the DOS command prompt or via a special 'Access' program. The most important options from Access allow the Silk system to be run in various ways, but there are also options to 'install' the system, print graphics, translate files to or from Lotus and other formats, and run a tutorial.

Before any of the other options are tried, 'install' must first be used; this is needed to specify what type of display card is in use in the PC, and which printer is attached. This is all completely straightforward, although the range of printers is rather small. And clearly, if the PC does not have a graphics display card, it will not then be possible to use Silk's graphics facilities.

For newcomers to Silk there are some tutorial exercises in the manual, but perhaps the easiest way to learn the system is with the interactive tutorials, available as an option on the Access menu. These tutorials are actually ordinary spreadsheet models, mainly comprising text but run under the control of Silk's macro facility. The new user need not be aware of this (although an experienced user could easily tailor them for in-house teaching requirements). The new user simply sees a sequence of screens full of information, explaining the various aspects of Silk, starting with the most basic introduction to spreadsheeting. Each screen has full instructions on what to do, and gradually the new user is taken through most of Silk's facilities.

When the user has worked through some tutorials he is in a position to start using the system, but to begin with at least may prefer to work with a Help display permanently on show. The Help display is always available at a single key-press, and remains in place until explicitly removed. It occupies about half the screen and elaborates on what options are available at any given moment, and contains other useful information, too. The information is changed each time a user action is made, to reflect the new alternatives available. This is known as context-sensitive help.

Silk comes with a file of over 200k containing nothing but Help information, so it is quite an extensive facility. Unfortunately the amount of help information on a given topic generally exceeds the space available for display, and so it is frequently necessary to spend time scrolling through the text until the required information is found. Perhaps a keyword search would be more convenient in these circumstances.

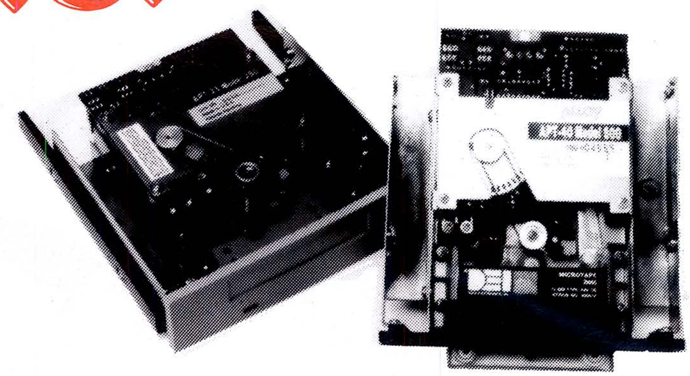
Spreadsheeting

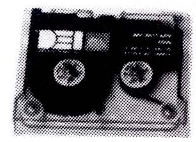
Silk has only a few surprises in its general organisation and facilities in its worksheet, with most of its specification being very similar to 1-2-3. Silk's worksheet, which is used to hold the data and formulae for the model being worked upon, is 256 columns wide by 2048 rows long. With Silk's sophisticated storage management procedures, these generous dimensions could, for example, allow the user to create several small models scattered right across a single worksheet. But it

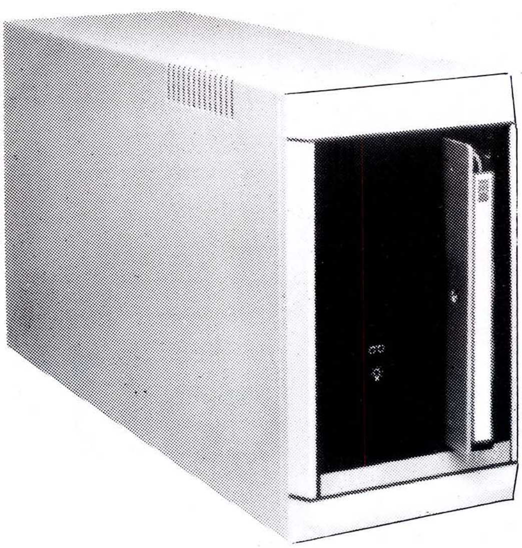
If your P.C. is stolen...

All that valuable data which took hours, days, months or years to build up – just sitting there vulnerable to corruption by a novice user, a lightning strike, a fire or worst of all STOLEN!

For an investment of as little as $995* you can rest assured your valuable data is backed-up safe and sound, automatically every day.







ALLOY offers you the simple to install and simple to use solutions:

The APT-25: A half-height 25 Mbyte capacity streaming cartridge tape drive which fits neatly into a floppy drive slot inside the PC and connects to the existing floppy controller.

The APT-40: Has all the features of the APT-25 but has increased storage of 40 Mbytes. Both are as simple to install as a floppy drive.

The FT-60: A 60 Mbyte stand-alone portable streaming tape subsystem that plugs into the external floppy port on the IBM® PC or XT. For the AT and most compatibles we offer the FTFA, a low cost controller, that provides the necessary interface.

Will your data go too?

The Software: The APT-25, APT-40 and the FT-60 come with ALLOY'S unique TIP software. Hailed as the simplest to use yet most sophisticated tape backup software, by expert and novice alike.

Features that make the difference:

- Menu-driven for ease of use
- File-by-file backup and restore
- Batch mode operation
- Backup by date
- TIPTOK for automatic operation
- Handles multiple tape volumes
- Upfront tape directory
- Backup modified files (archive bit) or complete drive
- Subdirectory search feature
- Network compatibility (APT-40, FT-60)

Do not delay phone us today and get the protection your valuable data deserves.

Recommended retail prices (exclusive of sales tax):

APT-25 $995* APT-40 $1295 FT-60 $1995 FTFA $325

Available from:

MicroHelp
micro Help
Computers

Tel: (03) 486 1555
Fax: (03) 486 2473
361 St. Georges Street,
Fitzroy, Victoria, 3068

ALLOY

We back you up

5 Enterprise Court, Mulgrave Victoria 3170.
Tel: (03) 561 4988. Fax: (03) 561 7412 Tlx: AA152657

IBM® is a trade mark of International Business Machines Corporation.

Penman/A1196

must be remembered that although there are approximately half a million cells in all, a standard 640k PC could only permit a small percentage of them to be filled. It is only with several megabytes of expansion memory that a significant proportion of this enormous area can be fully utilised.

As in 1-2-3, the columns in the worksheet are identified by letters and the rows are numbered, so each cell can be uniquely identified by a letter+number combination: A1 for the top left-hand cell and IV2048 for the bottom right-hand one. Of course, it isn't possible to see the entire area all at once onscreen. To get round this, Silk uses the standard spreadsheet windowing technique to display onscreen a small portion of the overall area: just 6 columns by 20 rows. Silk provides all the usual keystrokes for moving this window around the worksheet and allowing the user to enter, change or view the contents of cells. As on all spreadsheets the cell contents can be either numbers, text or formulae.

When entering a formula into Silk it is possible to create a 'circular reference'. This happens when a formula — directly, or indirectly — references the cell within which it is contained. As this almost always represents an error in the model, Silk can detect that this has happened and help the user track down the offender.

In general Silk parallels all 1-2-3's formula facilities, including its ability to control recalculation in various ways and its conventions for 'relative cell references'. The only major difference between Silk and 1-2-3 in respect of formulae and calculation, is that Silk has no database functions and does not precede its function names with "@" (1-2-3 uses "@cos(. .), Silk uses "cos(. . .)"). Everything else is as in 1-2-3.

It is also possible to enter a macro command into a cell and then have Silk execute it rather like a program. Using this complex facility could be the subject of a whole article itself, but in brief, macros allow the user to specify commonly used procedures once and for all and then re-use them over and over again, invoking them with just a couple of key-strokes. Macros can also be useful in setting up tailored applications. And Silk has the full range of macro facilities, as in 1-2-3.

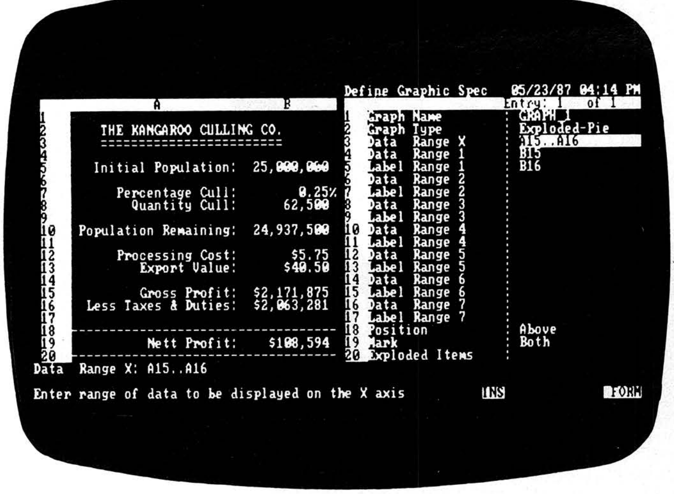
For some reason Silk does not have 1-2-3's ability to display different parts of the worksheet in two halves of the screen — the 'split screen' facility. This is possibly lacking in Silk because of the additional display complications caused by its extra Help and forms displays.

Silk also has all 1-2-3's worksheet editing commands, for deleting, inserting, copying and moving cell contents from one place to another. These all work in a practically identical fashion to 1-2-3. Undoubtedly, an experienced 1-2-3 user could sit down with Silk for the first time, without a manual, and within only a few minutes could tie all the facilities and functions together to create the sort of model shown in the screenshot.

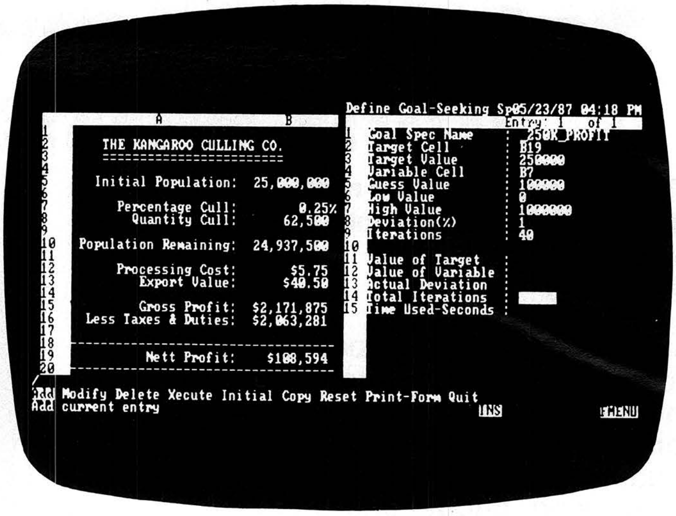
Performance tests

In order to assess the relative performances of 1-2-3 and Silk when running a fairly typical application, a simple Benchmark test was used. The objectives of the test were to determine: (a) the size of model each could handle (on a 640k PC); and (b) their respective calculation speeds. Both factors are very important aspects of a spreadsheet's performance.

The test simulated a typical '12 months plus totals' financial calcula-



To produce a graph you first fill in a form which can be saved to disk for later use. Pie, bar and line charts are available



One of Silk's added extras is its ability to goal seek. A form is used to specify which cells can change and the value of the target cell

tion. It involved first of all setting up the top row of the worksheet with the numbers 1 to 12 across the first 12 columns. This was done by setting the A1 cell to one, the B1 cell to the formula A1 + 1, the C1 cells to B1 + 1, and so on. Next, the first column of the second row was given the formula:

A1 + (13 * A1) / A1 - 1

This formula is an inefficient way of evaluating A1 + 12, but it involves the primary arithmetic operations once each. It was copied across the row, resulting in the numbers 13 to 24 being displayed. In the thirteenth column of this second row, the formula 'sum(A2. .L2)' was entered. This sums all the numbers in that row. This second row was then copied down to the 200th row and recalculation timings were made, for when the top left cell was changed from 1 to 1.5. This single change forces a complete recalculation through every cell, resulting in a lengthy and significant amount of computation. Following this the rows were copied further and further down until memory was exhausted, and the number of rows thus reached was used to measure the capacity of the system.

The results of the performance tests are summarised in the table. With recalculations, there was no significant difference between the two systems — a good result for Silk, as 1-2-3 is noted for extremely good calculation speeds. But, of course, there is no evidence from these tests that Silk is three times faster than 1-2-3, as Daybreak Technologies is claiming!

The capacity test was less good for Silk, with about half the capacity of 1-2-3 on a 640k PC. This is largely because the Silk software itself is larger than 1-2-3, leaving only 255k for workspace, after it is loaded, whereas 1-2-3 allows 439k. Probably the capacity differences would seem less significant if comparisons were made with a megabyte or two of expanded memory available in the PC.

Business graphics

Silk can plot data from the worksheet in a variety of graph styles, including pie charts, line graphs and bar charts. It can use colour.

The end result from Silk's graphics facilities is much the same as in 1-2-3, but the interaction to produce the graphs is slightly different. 1-2-3's graphics are driven entirely by menus, but Silk uses 'forms' for the user to specify the graph to be plotted (see screenshot).

Silk's forms, which are used in a few other areas of the system as well, are presented in a window on one side of the display. The user can freely move the action-point cursor up and down all the entries, and make changes as necessary. The form behaves in many respects like a very restricted worksheet. For entries which require coordinates from the worksheet, the user can temporarily escape from the form to find the place required. Any number of forms can be retained to specify different types of 'plot' that may be required, and they can, of course, all be saved permanently on disk along with the model in the worksheet. In general, I found the forms slightly easier to use than 1-2-3's methods, so this must count as a minor plus for Silk.

In the graphics forms it is possible to specify which style of graph is to be drawn, what information from the worksheet is to be plotted, annotation for the axes, titles and scaling, and so on.

Extra facilities

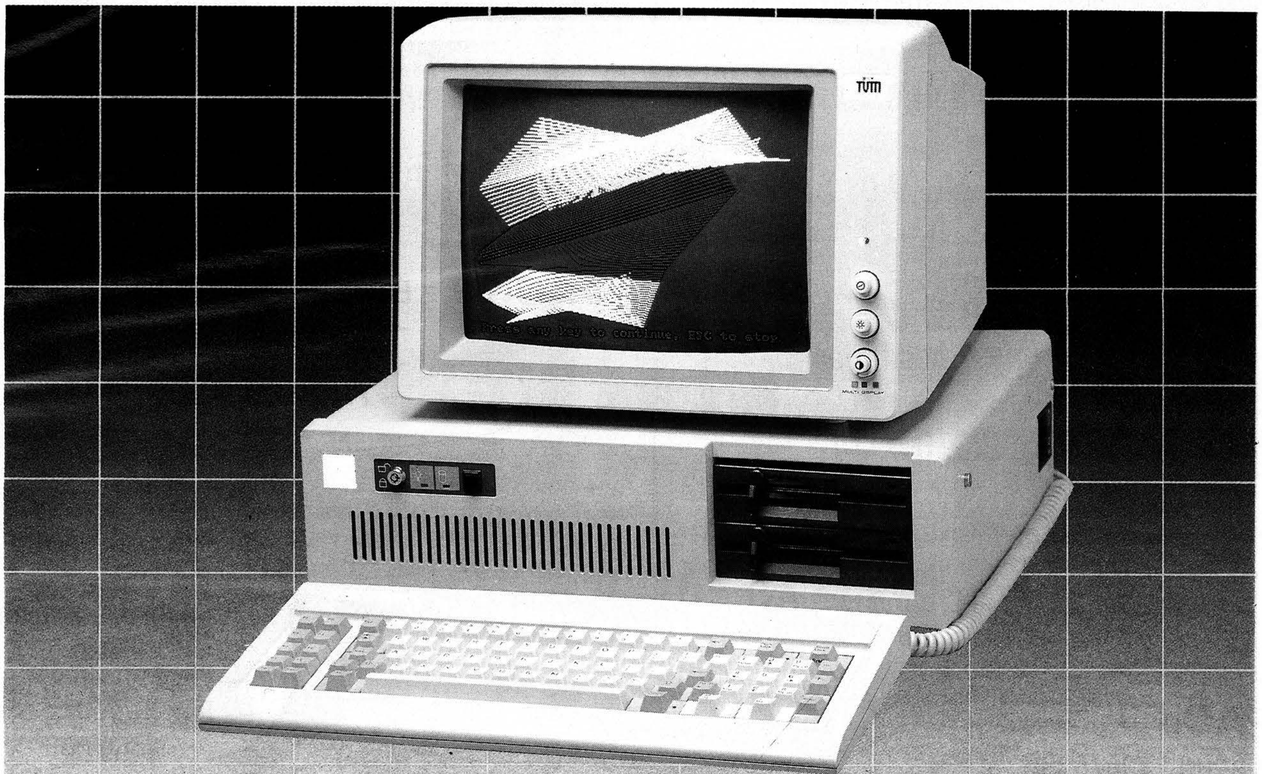
As I have already mentioned, the Silk manual gives some prominence to a miscellany of 'advanced features'. Although none of them is likely to make Lotus tremble in its boots, they may be of interest in some specialised circumstances. Some of them I have already covered elsewhere, so I'll now briefly go over the remaining ones:

- **Keystroke logging** One of the more unusual features in Silk is that when it is first started up, it can be made to run with 'keystroke logging' enabled. With keystroke logging, every keystroke made during a session is recorded in a 'log' disk file, and the complete session can subsequently be rerun from the 'log' file. Logging will not operate from a floppy disk, but on a hard disk-system there are no discernible delays while the keystrokes are being logged.

A common problem in spreadsheeting is that it is very easy, using the very powerful worksheet editing commands, to overwrite or delete some part of the model accidentally. Without keystroke logging the only recovery from this

PREMIER

286



80286 Processor running at 6/8 Mhz
Licensed Phoenix Bios
512 Kb mainboard upgradable to 1 Mb
360 Kb disk drive
Colour graphic card
Power supply
AT keyboard
Licensed MS DOS

$1590
TAX INCLUDED

TOTAL PERIPHERALS PTY LTD

25, Floss St, Hurlstonepark, Sydney, NSW 2193, Australia. Tel: 02-5595311
(Wholesale Only)

DEALERS

NSW:	LEICHARDT	569 2884		HORNSBY	489 1360
	CROWS NEST	439 2703		BONDI	371 5137
	ROSEBAY	371 8951		CHARLS TOWN	(049) 42 1444
	WOOLLAHRA	489 6255	**ACT:**	BRADDEN	(062) 57 1808

WA:	PERTH	(09) 227 8590
SA:	ADELAIDE	(08) 42 1887
VIC:	MELBOURNE	(03) 288 3611
QLD:	BRISBANE	(075) 35 9589

AUSTRALIA'S No. 1 SELLING PRINTER AT U.S.A. PRICES

THE AUST $ UP THERE WILL NEVER BE A BETTER TIME TO BUY

DISKS AT UNBEATABLE PRICES

Quality disks with lifetime warranty. Free freight anywhere in Australia. Pre-packed ready to go.

PACK 1 2 Boxes D.S. D.D. 5¼" Disks $32.00

PACK 2 3 Boxes D.S. D.D. 5¼". Free "Wet Ones" head cleaning kit. $49.90

PACK 3 5 Boxes D.S. D.D. 5¼". Free "Wet Ones" head cleaning kit. $87.50

PACK 4 2 Boxes D.S. D.D. 3½" Disks. $98.00

5 WAYS TO BUY THE BEST "EPSON" PRINTERS

- 12 months nationwide warranty
- Free freight mainland Australia
- Pre-packed ready to go
- Comet or TNT available
- Will suit — Apple, Commodore, BBC, IBM, Amigo, Microbee, Tandy

PACK 1 EPSON LX86/GX80
— inc Tractors
— Printer cable of your choice
— Free extra ribbon
$449.00

PACK 2
EPSON LX86/GX80
— inc Tractors
— Cable for computer
— Pack paper
— Head cleaning kit
— Box disks D.S. D.D.
$469.00

EPSON LASER PRINTER

By the time this Mag is printed we will have this new printer. You won't beat our price!

PACK 3
EPSON LX86/GX80
— inc Tractors
— inc Cable
— inc Box 3½" disks D.S. D.D.
— Spare ribbon
$492.00

PACK 4 EPSON LX86/GX80
— inc Tractors
— inc Cable
— 2 Boxes 5¼" D.S. disks
— Head cleaning kit
$497.00

BECAUSE WE'RE THE BIGGEST AND OLDEST COMPUTER MAIL ORDER HOUSE IN AUSTRALIA

YES WE WILL STILL BEAT ANY ADVERTISED PRICE BY $10* AND DELIVER FREE!

*OVER $100

Mail order Shepparton (058) 21 7155*

DataParts
The best computer people in the country.

bankcard

Available from these outlets–

CAMBERWELL: 519 Burke Road	(03) 20 7895
BENDIGO: 419 Hargreaves Street	(054) 43 4866
SHEPPARTON: 11 Edward Street	(058) 21 7155
WOLUNDRY COMPUTERS: Wagga	(069) 21 6466

CREDIT CARDS Phone sales accepted

FREE DELIVERY ANYWHERE IN AUSTRALIA
CALL NOW AND SAVE! YOU WON'T BEAT OUR QUALITY OR PRICES!

DATAPARTS
Fully authorised IBM dealers.
If you think these prices are competitive, wait until you see what we can do with IBM PC's and other IBM products. Don't buy any IBM gear until you talk to DataParts. We've got the works, from complete systems to the widest range of IBM software and compatible products.
* *Prices advertised must be quoted*
**Prices subject to change without notice.* MFA DP PO49

Trade Enquiries Welcome

* *For items over $100*

situation is to either abandon the session without saving the model and then re-do all the changes that were made, or else attempt to reconstruct the damaged parts of the model. Neither option is viewed with much relish by most users. But with Silk's logging facilities it is possible to abandon the session and then effortlessly replay it from the log file, of course stopping the replay just before the fatal command is issued.

Not only can the logging facility be useful for recovering from errors, but it is an excellent means for creating demonstration systems or tutorials, and some users may even use it for auditing. Why didn't someone think of it before?

• **Goal seeking** Most worksheets are built up of cells containing formulae referencing other cells with formulae, and so on, eventually culminating with formulae referencing cells containing raw input data. Typically the bottom line of the worksheet is the most important one, containing formulae which may indirectly refer to just about every previous row in the model. For example, a TOTALS row could contain formulae that reference the three value-of-sales rows above it, with these in turn each referencing the two rows immediately above them. These numbers of sales and price rows all contain raw input data.

It is not unusual for the bottom line of a model to be subject to targets, and it can be problematical trying to 'cook' the raw input data higher up the model so that the targets are met. This is where Silk's goal seeking facility can be of use.

Suppose that the Jan-Mar sales target in a spreadsheet is $200,000. Clearly, if the number of sales of Product 1 were adjusted, then this target could be met. Instead of adopting a trial and error approach to find this value, the goal seeking option can be selected. A 'form' is used to specify that $200,000 is required in cell B19 and that cell B5, containing Product 1, can be adjusted to achieve this. The goal seeking algorithm used by Silk also requires some help before it can solve this problem. It needs to be given a first guess for the variable cell, and it also requires a few limits to be specified so that its computations can stop in reasonable time, should it be unable to find a solution.

Benchmarks

	Silk	1-2-3
Capacity:	370 rows	660 rows
Calculation time:	15 secs	14 secs

The tests were run on a 640k Zenith 150, with a NEC V-20 at 4.77MHz and a numeric co-processor

The details of the tests are given in the text.

When the goal seeking is successfully completed, the worksheet is updated with an appropriate new value in the raw input data cell and the required target value in the formula cell. When the new value is in place, the target value could also be arrived at by recalculating the worksheet in the normal way. Notice that Silk does not generate an integer result; and it can only vary one cell to meet the target — in the example here, it would have perhaps been advantageous if the sales of all three products could have been adjusted, and not just one.

Clearly Silk's goal seeking facility has its uses but it is subject to some limitations, and anyone needing really powerful goal seeking might be advised to try some alternative (non-spreadsheet) modelling systems.

• **Time series** On time-based models, it can sometimes be tedious to continually copy formulae across each time period, and it can also be difficult to maintain these models when new periods are added. For example, a model could be built in the conventional way with formulae copied across the columns, and the total column using the 'sum' function to calculate the row totals. But the model could have been built with the time-series facilities, and the copying and summing would all have been automatic. When the time information has been specified, the only action needed by the user is to specify the relationships between the rows.

When using time-series facilities the end result is the same as with conventional spreadsheeting, but especially when more complex time periods are needed, it can be a lot more convenient. For example, by using time-series facilities, models can easily be set up with monthly columns, quarterly totals and an annual total. The formulae are automatically set up to do all this once the user gives the basic row calculations. A typical row calculation might be that:

Profit = Value of Sales - Costs

All the formulae in the profit row would then be generated from this one 'English' formula. Of course, this facility is closely related to the classical financial modeller type of packages, where the 'logic' of a model is specified in a very similar way. With most financial modellers, however, the interactive worksheet is missing and they are generally a lot harder to use than spreadsheets.

Conclusion

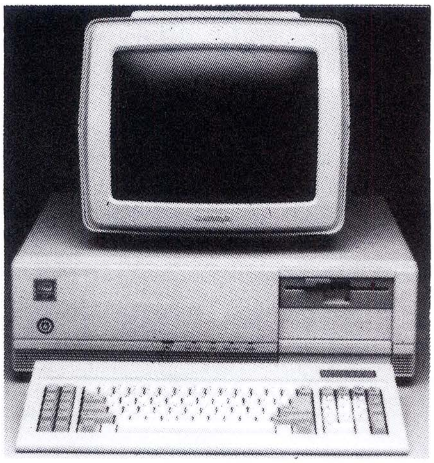
For anyone interested in a 1-2-3-like system at a third of the price, but lacking a database facility, Silk must be a serious option to consider. It does require more memory than 1-2-3, and this is likely to push the user into purchasing memory expansion boards rather earlier. But much of the system will seem very familiar to a 1-2-3 user, and for many it could be a more than satisfactory substitute for the 'real thing'.

END

Silk costs $345 and is available from PC Extras, PO Box K9, Haymarket NSW 2000. Tel: (02) 319 2155.

'I'm afraid you've made a mistake ladies, the bingo hall is next door.'

Hales & Rogers Permanent Discounts and Monthly Specials



★ 8MHz 80286 WITH IMB 120nS RAM
★ PRINTERPORT, RS232 PORT, REAL TIME CLOCK CALENDAR
★ HIGH RES THOMSON TTL 12" MONITOR
★ MS-DOS 3.20 GW BASIC
★ 1.2 MB/360K FLOPPY & 20MB HARD DISK DRIVES
★ 12 MONTHS WARRANTY

OUR SPECIAL FOR THIS MONTH

$4547 RRP $5462.

INCLUDING SALES TAX WHILE STOCKS LAST.

EVERY ORDER PLACED THIS MONTH RECEIVES A FREE INSTALLATION KIT COMPRISING PC STAND & CABLES AND A KAMBROOK SURGE-GUARD

$132 VALUE, FREE

SERIOUS SOFTWARE

Serious software at trivial prices.

SERIOUS SOFTWARE	H&R	RRP
Clipper	$973	$1,345
Copy Write	$95	$125
dBase III+	$950	$1,470
EBA Business Accounting	$564	$675
Fastback	$166	$198
First Choice	$237	$329
Genifer	$464	$661
Graph X	$99	$125
Harvard Total Project Manager	$718	$1,037
HOT — Menu utility	$162	$208
Lettrex — Printer enhancement	$155	$199
Logitech Modula 2 — ROM Pack	$423	$505
Logitech Modula 2 — BLS/87	$169	$205
Logitech Modula 2 — BLS/512	$310	$371
Logitech Modula 2 — Toolkit	$155	$188
Logitech Modula 2 — Windows	$125	$468
Lotus HAL	$240	$334
Lotus 123	$660	$1,099
MACE & Utilities	$165	$195
Microsoft Macro Assembler	$557	$449
Microsoft Word with Mouse	$1,029	$1,244
Microsoft Project	$726	$881
Microsoft Word	$790	$960
Microsoft MS Sort	$379	$449
Microsoft Learning DOS	$106	$108
Microsoft Access	$444	$540
Microsoft Windows	$204	$256
Microsoft Chart	$533	$654
Microsoft Multiplan	$406	$580
Mirror	$85	$123
Multimate Advantage	$866	$1,203
Norton Utilities Advanced	$233	$302
Norton Utilities	$133	$166
Norton Editor	$202	$255
Norton Commander	$121	$349
Open Access II	$1,022	
Paradox	$1,128	
PC-Introduction	$61	$74
Printworks Laser Jet support	$255	
Printworks	$137	
Prodesign II	$592	
Sidekick unprotected	$117	$172
Sideways	$127	$153
Smart II series	$1,183	
Symphony	$977	$1,470
TAS — Plus Developer's	$562	$649
TAS — Plus Relational Database	$196	$227
TAS — Plus Modifiable Accounting	$986	$1,139
TimeLine — Project Management	$706	$892
Twin	$292	
Typequick	$76	
WordPerfect Ver 4.2	$657	
WordPerfect Library	$175	
XTREE — Hard Disk Management	$92	$112
Zero Disk	$89	

PRINTERS

Brother M1509 180cps 136col 9pin head with push tractor, NLQ mode, 3K byte buffer, serial and parallel interfaces, auto single sheet load, quiet operation ..... **$795** RRP $1069

Brother M1709 240cps 136col 9pin head with push tractor and paper parking, 24K byte buffer, serial and parallel interfaces, auto single sheet load, quiet operation ..... **$995** RRP $1320

Brother 2024L 160cps 136col 24pin head push tractor feed, 1.8K byte buffer, letter quality with dot matrix speed, serial or parallel interfaces, optional cut sheet feeder ..... **$1150** RRP $1450

With any of the above this month you get a FREE Printer Stand normally priced at $35.

ACCESSORIES

Printer Stand to suit 15" printers, no paper tray, no bells or whistles, takes a 2" stack of paper under the stand **$35**

PC Off Desk Stand suits virtually all PC/XT/AT computers. Stands your PC vertically on the floor at the end of your desk and lets you use the top of the desk for what it was intended **$35**

PC Extension Cables Usually necessary with the PC stand

Monitor extension cable 3m suits RGB & TTL monitors	**$18**
Keyboard extension cable 1.8m	**$12**
Monitor mains cable extension, for monitors that plug into the switched outlet on the PC	**$12**

Floppy Disks PERFECT Brand 100% certified with a life time warranty. All prices below are for packs of ten discs. Less 5% for 100 discs.

5.25" DSDD 48TPI Bulk Pack with tabs, labels & envelopes	**$22**
5.25" DSDD 48TPI Boxed with tabs, labels & envelopes	**$26**
5.25" DS1.2MB 96TPI Boxed with tabs, labels and envelopes	**$74**
3.5" DSDD 135TPI Boxed with tabs, labels & envelopes, packs of 5 discs	**$68**

Printer Paper

11" x 9.5" 70gsm Plain Bond smooth edge 900 sheets	**$26**
A4 70gsm Plain Bond smooth edge 900 sheets	**$30**
11" x 15" 60gsm Blue Cross Ruled 900 sheets	**$23**

MODEMS

Netcomm 1200 Internal 1200/1200 baud	**$639**	RRP $ 824
Netcomm 2400 Internal 2400/2400 baud	**$862**	RRP $1,111
Netcomm 123 Internal 300/300 1200/75 1200/1200	**$874**	RRP $1,127
Netcomm 1234 Internal 300/300 1200/75 1200/1200 2400/2400	**$1,083**	RRP $1,397
Netcomm 123A External Async 300/300 1200/75 1200/1200	**$1,039**	RRP $1,339
Netcomm 1234A External as per 123A 2400/2400	**$1,265**	RRP $1,631
Netcomm 3+12 External 300/300 1200/75	**$262**	RRP $ 337
Netcomm 3+12 External Auto 300/300 1200/75	**$432**	RRP $ 558

TAPE BACKUP UNITS

Back up your hard disc drive in minutes instead of hours. All drives include manual and software and one tape cartridge. Installation at our workshop from $150.

Irwin 110 10MB half height internal for XT/AT computers	**$795**	RRP $ 890
Irwin 120 20MB half height internal for XT/AT computers	**$1,201**	RRP $1,390
Irwin 145 40MB half height internal for AT computers	**$1,511**	RRP $1,670

BORLAND SPECIALS

Stop hitting yourself on the head with a basic interpreter!

Eureka	**$155**	RRP $210
Reflex Workshop	**$116**	RRP $146
Reflex Data Base	**$231**	RRP $298
Superkey	**$140**	RRP $185
Turbo Prolog Toolbox	**$155**	RRP $207
Turbo Prolog	**$155**	RRP $210
Turbo Basic	**$155**	RRP $207
Turbo Gameworks	**$116**	RRP $146
Turbo Graphix Toolbox	**$116**	RRP $146
Turbo Lightning	**$155**	RRP $207
Turbo Numerical Methods Toolbox	**$155**	RRP $207
Turbo Editor Toolbox	**$116**	RRP $146
Turbo Database Toolbox	**$116**	RRP $146
Turbo Pascal Vers 3 with 8087 & BCD	**$155**	RRP $207
Turbo Word Wizard	**$125**	RRP $158
Turbo Tutor	**$ 65**	RRP $ 89
Turbo C	**$155**	RRP $207

Hales & Rogers Pty. Ltd.

5 Mobbs Lane, Carlingford 2118

Tel. (02) 858 5322

To: Hales & Rogers.
Please send me the following item/s.

Name

Address

Postcode

☐ Price List & Newsletter only.
Add $5 for each order post & packing.
Cheque enclosed $
Please charge my ☐ Bankcard ☐ Master Card

Signature: Expiry Date:

ADCO/587

Warranty: All products sold are covered by the manufacturer's warranty.
Sales Tax: All prices include sales tax. We can supply tax free, please call for prices.
Sources: All products are sourced from the authorised Australian distributor and carry their full support.
Prices: Are subject to change without notice. Please check before ordering.
Stock: We endeavour to keep stocks of the more popular items at all times. Delivery usually overnight providing your order is in before noon!

Database managers and LANs

Developments in the area of connectivity technology will play an important role in the progress of data managers for LANs. Dave Browning explains.

The sharing of data by multiple users is not new: it has been done for years on mainframes and minicomputers. However, when this idea is applied to the PC environment in the form of data managers for local area networks (LANs), some fundamental differences in the implementation create the potential for substantial impacts on system operation and performance.

The primary concern of data management in a shared data environment is preserving data integrity. In single-user data management applications, the individual user 'owns' all the data and is responsible for its accuracy or integrity. In multi-user systems the ownership of each data element must be established. Many data managers provide security features to accomplish this. Ideally, each element is assigned to one individual who is responsible for its maintenance. Other users may be allowed to view the data, but only the owner is allowed to update its value.

In some cases, the ownership of data elements must be shared. For example, in an order entry system, the number of units of an item on hand is updated by many persons. Sales people reduce the number of units on hand by making sales from stock, while purchasing and receiving personnel increase the number of units on hand by replenishing stock. In cases such as this, the data manager must coordinate the changes to the data elements so that the current value in the database reflects all previous updates applied by all users.

In multi-user and LAN systems, access to data must be controlled so that data changes are performed logically and systematically. The operating system provides the mechanism for locking and releasing files or portions of files upon request of the data manager. (Data locking is addressed below).

Mainframes and minicomputers generally have a single operating system with which the data manager interacts. In a LAN, each microcomputer has its own operating system in place, and the network file server often has its own separate operating system as well. Usually each microcomputer is running a copy of the data manager, unaware of the copies running on other machines that are sharing the same data.

This article examines the methods used by data managers on LANs to address the problem of data integrity, how these implementations differ from single-user and mainframe/minicomputer multi-user systems, and how the implications of LAN data management affect the design of LAN database applications. Where common data manager, computer, operating system, and network terms may have ambiguous meanings in different contexts, a definition or description will be provided to establish a common basis for the discussion.

The mainframe/minicomputer environment provides two distinct advantages for data manager applications. First, the operating system is designed for multi-user management, and support is provided for file and record locking. Second, because all processing is performed at the CPU, it is not necessary to transfer extraneous data from intermediate operations between the computer and terminal. For example, a query may include a request for the average salary of a set of personnel records in a table. This requires processing of several records, but the result is a single number. In the mainframe/minicomputer environment, the manipulation of the data records and the computation of the resulting average is performed by the central processor. In a LAN environment, a query such as this may require large amounts of intermediate data to be transmitted over the LAN to the user's computer, where the analysis and calculation are actually performed.

The LAN environment connects multiple computers, each running under its own operating system. The network also has an operating system that manages the server computer, and provides an interface to the user DOS. In most implementations, the individual user's DOS is unaware of the existence of the other computers on the LAN or of the LAN operating system. Interrupts are trapped by the local LAN operating system software components and directed to the local DOS or to the LAN operating system for handling as appropriate. The LAN is normally viewed by DOS as an external device consisting of a set of disk drives. This perception holds even when the inherent network feature of DOS 3.1 or later is used, because the network functions are performed by add-in programs and the processor on the network adaptor card.

The LAN software provides an interface between the local application program and data located at a file server elsewhere on the network. It provides mechanisms for locking files and portions of files, permitting access by multiple users to common data.

Singular data management

Data managers are programs that

store, retrieve, and manipulate data. A data manager system can be separated into two parts, the database manager (DBM) and the database application interface (DAI). This is an important distinction to make, because system performance depends heavily upon the locations of the DBM and DAI components relative to each other, to the data storage device, and to the user.

Functionally, the DBM interacts with the computer's operating system to save and retrieve raw data that is retained on the system's storage devices. The DBM also interprets directions provided by the DAI and translates them into data manipulation actions, performs the actions, and provides the results to the DAI. Data manager performance depends to some extent upon the data manager model (that is, relational, entity-relationship, or network), but optimisation of storage techniques and DBM program logical design provide for a wide range of efficiency across all categories.

The DAI assists the user in formulating queries that are passed to the DBM. Once data is retrieved, the DAI presents the data to the user, manipulates it, and returns the updated data to the DBM. Several varieties of DAI are available. An interactive, or direct-user, DAI is provided by almost all microcomputer data managers and by many mainframe/minicomputer data managers. All mainframe/minicomputer data managers allow a custom DAI to be written in languages such as COBOL, PL/1, or FORTRAN and provide an interface from these languages to the DBM. Some microcomputer data managers support this kind of external language DAI, although most require that the DAI be written in the data manager's internal command language.

For example, dBase III Plus (from Ashton-Tate) contains three DAIs: the dot-prompt editor for direct, interactive entry of dBase commands, the assistant for menu-driven user activities, and the interpreter for running customised programs written in the dBase command language. Another data manager, DataEase provides a direct menu-driven user DAI, and recently the author has added a query command language DAI as well for generating queries.

Oracle, a relational data manager for mainframes and minicomputers, is now available for PCs running DOS and soon will be offered in a LAN version. In testimony to its mainframe origin, Oracle includes several features, such as transaction processing and back-out and extensive security, that are not found in many data managers designed for stand-alone microcomputer use. The PC version of the program contains a DBM called the kernel, a direct user DAI called the UFI (for user-friendly interface), and an external DAI interface for programs written in the C language.

Each microcomputer data manager provides at least one method for formulating queries; many offer two or more.

Popular query DAIs are query-by-example (QBE), relational algebra, and structured query language (SQL). Applications developed either in the data manager language for the interpreted environment or in an external language can hide the data manager's query method from the user. Common queries for predetermined reports frequently are built into an application.

'In both multi-user and LAN environments, all access to data must be controlled so that data changes can be performed systematically.'

These reports accept parameters from the user at run-time. For example, the query to perform a sales performance analysis may be quite complex, but the user would be required to provide only a date range and department selection. The logic of the query would be implemented by the applications developer.

Fig 1 illustrates some common implementations of data managers on a single-user system. The data manager is shown as a single unit divided into its two parts, the DBM and the DAI.

In the configuration on the left, the DAI is a direct user interface and communications with the user via the keyboard and screen. The DBM portion of the data manager manages data on the system disk, using DOS calls to manipulate files. DataEase is such an implementation: the user selects activities from menus and enters data under full control of the DataEase program.

In the centre configuration, an external program DAI is used to communicate with an application program that is written in a general purpose language, such as C. The application program performs the communication with the user, issues directives and presents data to the DBM, and receives data from the DBM for presentation to the user. An application program that is written in C for the Oracle data manager or for Softcraft's Btrieve file manager would be an example of this configuration.

The configuration at the right in Fig 1 is one in which the data manager includes an internal programming or command language DAI. In this situation, the application program communicates with the user through the DAI; the DAI then issues the appropriate DOS calls to communicate with the user. A dBase or Microrim R:base 5000 application program being executed by the data manager's command interpreter is an example of this implementation.

Multi-user configurations

In multi-user mainframes and minicomputers, various configurations are available for the operating system and a data manager to serve more than one simultaneous user, as shown in Fig 2. In a virtual machine configuration (on the left), the computer system is controlled by an umbrella operating system (such as the control program in IBM's VM system). Each user is provided with a virtual machine that appears to the user as a fully configured computer, complete with its own operating system. Within a virtual machine, the data manager operation may be the same as any of the implementations described above for single-user systems.

When two or more virtual machines contain copies of a data manager accessing the same database, each copy must use the locking mechanisms provided by the operating system to protect data integrity. The application programs are prevented by the operating system from interfering with locked data — this can be thought of as a 'physical lock.' Other locking mechanisms called 'logical locks' may be designed on an application-specific basis. Locks such as these draw support from the operating system in the form of mechanisms such as semaphores, but the application programs are responsible for respecting these types of locks.

In a similar multi-user configuration (centre), memory is partitioned into user areas into which copies of data managers and other application programs may be loaded. System resources are managed and allocated by the central operating system, and application programs must be designed to run under the specific operating sys-

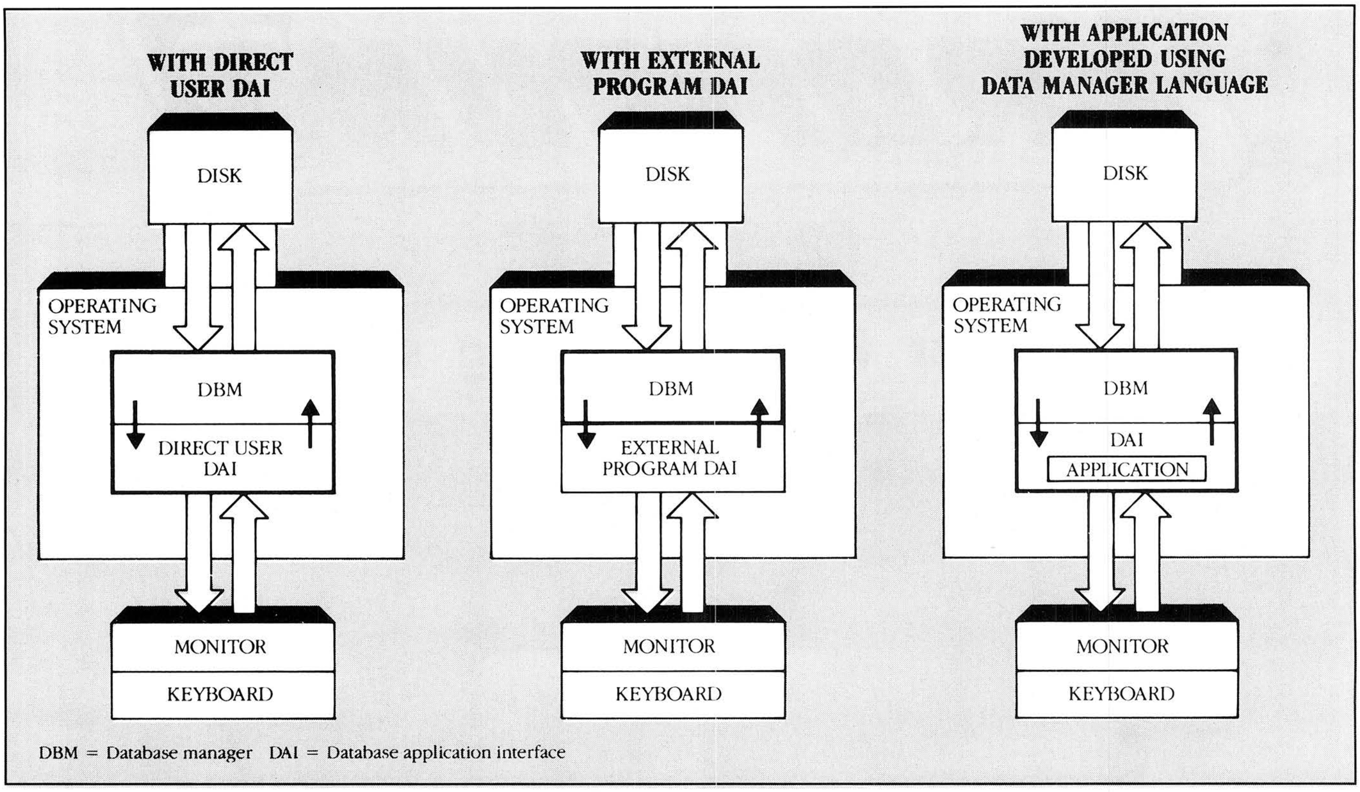


Fig 1 Data manager single-user configurations. Data managers can be divided into two parts, the DBM and the DAI, which can work in three ways. The DAI can communicate directly with the user (left), or through an external language program DAI (centre), or be integrated with an application program written in the data manager language (right). In every arrangement, the DBM portion manages data on the system disk

tem used in the computer. Simultaneous access to a single database again requires administration of locking mechanisms by the operating system in place, and the data manager copies must be aware of the locks and respect them.

The configuration shown at right in Fig 2 illustrates a mainframe/minicomputer set-up in which the DBM has been designed to perform data management services for any number of simultaneous users. The data management code for this system is written to be re-entrant, and a single centralised copy of the DBM is loaded into the computer under the operating system. Then, separate user areas are loaded with the appropriate DAI and application programs. This centralised DBM approach, although more difficult to design and develop, maximises the effective use of system memory, and provides a closer coupling between the data management program and the operating system.

LAN implementations share similarities with both the single-user and the partitioned multi-user configurations just described. Fig 3 shows the arrangement of a data manager operating on a single-user machine connected to a LAN. The data manager looks to the operating system to provide access to data and management of the locking mechanisms. Data that is to be shared with other users connected to the LAN normally will reside on the mass- storage device at a network file-server machine. The LAN interface at the local user machine provides two services needed by the data manager: first, the network mass storage attached to the server is mapped into unused local disk drive designation letters; second, it makes available a method for the application programs to communicate with the network operating system for functions that control data locking.

With the release of DOS version 3.1, IBM and Microsoft introduced a network interface. Certain DOS interrupts, most often file and print I/O requests, are redirected to the network operating system for action through a program called a redirector. Many non-IBM networks support this design and are considered to be DOS 3.1-compatible. In these networks, a device driver or a memory-resident program is loaded to supplement DOS with the proper interrupt handling for the network. Application programs such as data managers need only use the appropriate DOS calls for I/O and locking functions to be compatible with a variety of networks.

The IBM PC Network is considered a 'peer' network in that no dedicated host computer or server is present. The server portion of the IBM network software allows any PC on the network to perform server functions, namely access to mass storage and print devices, while also functioning as a PC. In other networks, servers often are dedicated PCs, or even specially designed server computers. To a data manager executing in a local PC on the network, the fact that file storage is being provided by a remote computer over a network interface is not logically relevant; the data manager simply requires access to data, regardless of its location.

Access and locking

Data managers that are operating in a shared environment must provide control of access to that data in two important ways: first, control of access to certain data elements for security reasons to prevent modification by inappropriate persons; and second, control of time-sensitive data locking in order

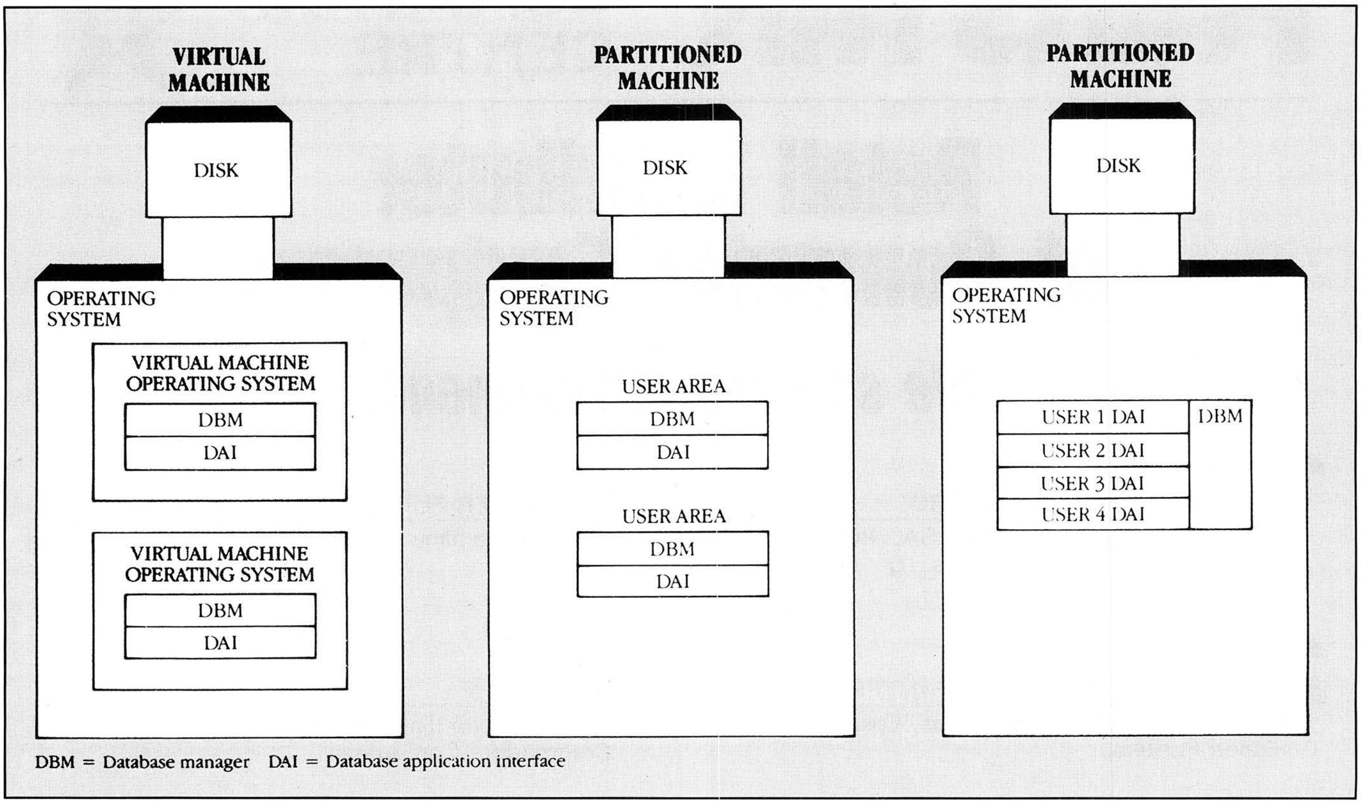


Fig 2 Data manager multi-user configurations. In a virtual machine configuration (left), each user is provided with what appears to be a fully configured computer, complete with its own operating system. A machine with partitioned memory (centre) is similar, but with each data manager executing in separate user areas. A centralised approach (right) is achieved with a single DBM interfacing with multiple copies of the DAI

to prevent simultaneous modification of data elements by multiple users.

LAN operating systems generally furnish a mechanism for providing security at both the user and file levels. Log-on procedures can be established by the network administrator via the creation of a user profile for each user or group of users to restrict access to specific directories and files. In addition, files may be assigned combinations of permission attributes such as read, deny read, write, deny write, modify, create, extend, delete, and share. These terms do not hold the same meanings across all networks. For example, write permission may include both replacement of existing data and addition of new data in one system, but can be separated into the more specific permissions of modify and extend in another. Also note that not all networks provide all file permission attributes.

Many data managers supplement the network permission and file-attribute modes with other security mechanisms. Depending upon the data structure used by the data manager, access may be granted to individual users on a file, record, field, or formula basis. For example, low-level workers in a personnel department may be granted access to all employee home addresses in the personnel files for update purposes, but may be restricted from viewing or changing salary information for employees whose salaries are above a certain level. These supplemental data access functions require the execution of an additional log-on process, supplied by the data manager program, prior to performing data management activities.

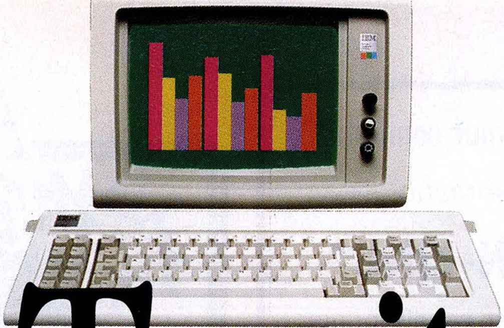
Audit logging of changes that users make to database data for security and recovery purposes is provided by some data managers. Audit log files may record various information, including the date, time, user ID, and name of the file or field modified. They also may hold the actual content of deleted records or field values prior to modification. Audit trails can be useful for locating the source of data errors, restoring databases to previous states, and determining the identity of users modifying particular database elements.

Once access to database functions has been established, users must be protected from interfering with other users as they manipulate data. This is perhaps the most important function provided by data managers employed in multi-user configurations.

To prevent simultaneous data update, a mechanism must be in place within the system to lock data elements while they are being modified. This mechanism must be administered by the operating system on the network file server or the central operating system of the multi-user machine so that access to data from all asynchronous processes (applications programs) operating in independent machines or independent user areas in a single machine can be controlled centrally.

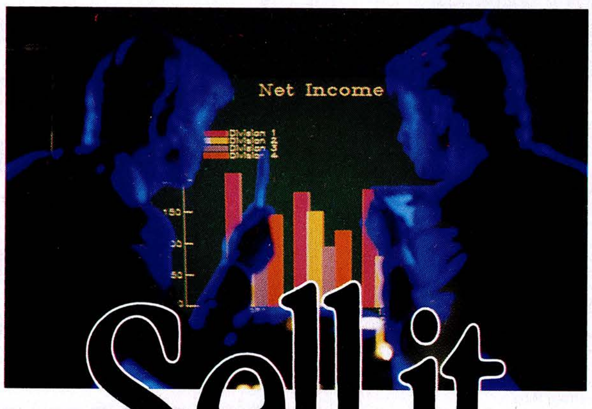
Data may be locked at the file, record, or data-element level. A file may be locked to prevent writing (deny write), reading (deny read), or any use of the file (open exclusive).

Generally, to lock a data region in a file, the data manager would call an operating system function, passing as parameters the file, a starting byte offset in the file, and an ending byte offset (or a starting offset and region length). The operating system then would respond with an indication of the success or failure of the particular request.



Tap it

Snap it



Sell it

Presentation is everything.

The **Matrix PCR** digital film recorder allows you to make 35mm slides from computer images. Combined with Lotus' masterful graphics software package **Freelance Plus**® it means professional business presentations everytime. For companies with vision. Call us on 712 3111 and we'll tell you all about it. Reg. TRADE MARK OF LOTUS CORP.

QUENTRON DIGITAL SYSTEMS

PO Box 147 Five Dock 2046 NSW (02) 712 3111 GPO Box 2212 Adelaide 5000 SA (08) 223 6224

PCCQ3

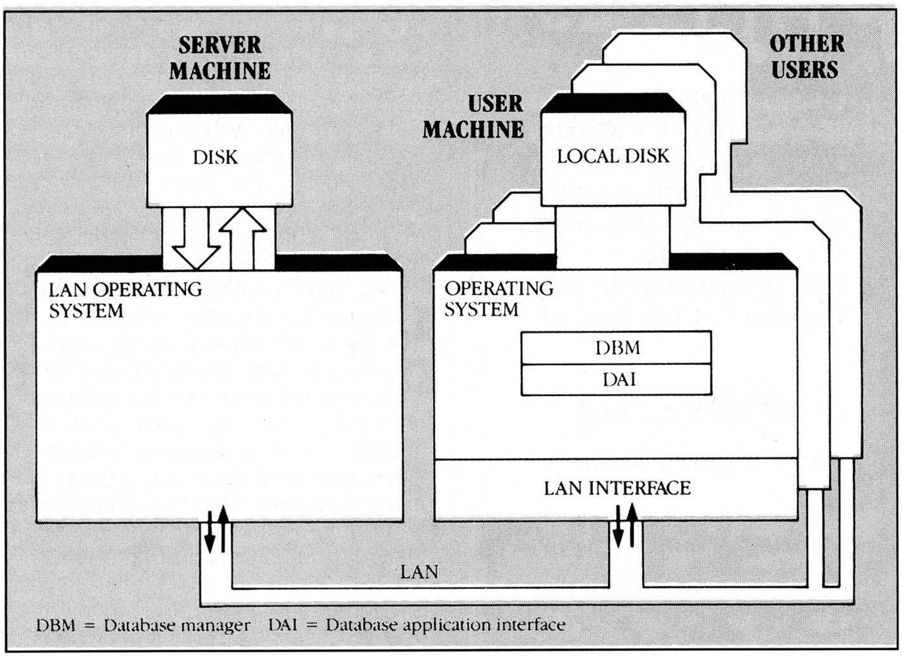


Fig 3 Data manager LAN configuration. Data to be shared among users on the LAN resides in mass storage at a network file server. The DBM at each machine communicates over the LAN with the server operating system, which provides access to data and manages locking mechanisms

In some systems, a time-out period can be a part of the lock request; if the operating system is unsuccessful in locking the requested area in the time period specified (because it is already locked by another program), then the operating system returns a failure status. Under operating systems that do not support a time-out error, the program could retry locking the record a predetermined number of times.

If the lock has been successful, other user programs attempting to write to the locked area are prevented from doing so by the operating system until the area is unlocked by the program that set the lock. The locked data area may or may not correspond to logical records in data files. Most data managers that provide locking functions to applications' developers do so on a logical-record level.

The ZIM data manager (by Zanthe Information, Inc.) locks data areas on a page basis automatically without the need for explicit requests by the applications programmer. dBase III Plus provides functions for record locking and file locking. For execution from the dot prompt or in assist mode, locking is performed automatically; programs that are written for the interpreter must manage locking and unlocking themselves.

Semaphore locking provides the ability to coordinate access to a resource through the user of a predefined signal. The operating system provides a table in which a program places a semaphore when it takes control of a resource; the semaphore is removed when the program releases control. Other programs then check the semaphore table to see if a needed resource is in use. The operating system also may manage queues of requests for semaphore locks on a first-come-first-served basis. Semaphore locks must be checked by the programs involved in the application because the operating system has no knowledge of the logical meaning of the semaphore.

These semaphore locking mechanisms may be advantageous for specific applications in order to minimise the use of low-level operating system locks. For example, in one dBase III Plus application, logical records were associated with specific individuals; the data items comprising the logical records were spread over several dozen files and were related by a unique key value that was derived from the individual's name. Rather than requiring each program to lock all records applying to the individual, a small log file (a dBase data file) was established to hold the keys of logical records currently locked and the identity of the user locking the record. Because all programs in the application were designed to check this log file before attempting to call up a logical record for modification, no additional locking was required. The dBase III Plus lock functions were used to lock the log file records when logging a key in order to prevent simultaneous logging of a single key by two users.

When changes are made that affect an entire file (such as reindexing, removing deleted records), the file often is locked. This may have a negative impact on performance because no other user may access the file for the duration of the lock. Using record locks where possible mollifies the effect on performance by making the remainder of the file available during the time one record is being updated. Even with record locking, though, contention for the same record may degrade response time. If a record is locked from the time it is read until it is updated, the time it is unavailable may be unacceptably long — the user may, for example, need to consult with someone else before making the update. Contention for the same record can be minimised by locking the record only for the time required to commit the update to the file.

Problems can arise in using this method. First, a data element's new value is often derived from its current value. If the current value changes from the time the record is read until the user is ready to apply the update, the user must be informed, so he can take appropriate action. Second, multiple users may be updating separate fields in the same record. One user's update should not overwrite fields other than the ones he has changed.

As an example of the first situation, consider an inventory stock file that contains two fields, stock number (STKNO) and quantity on hand (QOH). Several users are accepting orders for items over the telephone or at store sales counters. The process of making a sale is, first, to determine the quantity desired; second, to compare the quantity desired with QOH; and third, if the quantity desired is less than or equal to QOH, then to reduce QOH by quantity desired and enter order, else abort the order. The problem arises in the second and third steps.

Suppose 10 units of an item are on hand, and two orders are being placed, one order is for 6 units, the other is for 7. Both order clerks query the QOH of the item, and see that it is 10, sufficient for the sale. The first user places the order for 6 units, decreasing the QOH from 10 to 4, and replaces the QOH in the file with the new value of 4. Meanwhile, the second user has compared the QOH value 10 to the

order quantity of 7, determined that a sufficient amount is on hand, places the order for 7 units, decreasing the QOH from 10 to 3, and replaces the QOH in the file with the new value of 3. In this uncontrolled situation, a total of 13 units have been sold from a QOH of 10, and the QOH now says 3 are left. If the second order had been entered first, both orders would still be placed, and the QOH value would be 4.

Because the decision whether to update the QOH value depends upon the value at the time it was read, it would appear desirable to lock the value from the time it is first read until it is modified, thus preventing access by other users until the order process has been completed. This technique works, but it may introduce unacceptable time delays. If human action is required between the time the QOH value is read and the time the order is confirmed, the process can be easily interrupted, keeping the record locked for a substantial period of time.

A more workable solution in this case would be to eliminate the second step above (that is, querying the status of QOH) and, instead, simply to lock the record and attempt to place the order. If the file shows that sufficient QOH exists, the order is placed and QOH is updated in one step, requiring minimal lock time without human action during the lock period. If QOH is insufficient, the order is rejected and the operator informed of the rejection. The clerk then might query the actual QOH and attempt a new order of a lesser amount. This new order also might fail if another order were accepted during the time the first clerk read QOH and attempted to place a new order, but at least the integrity of the data in the file has been preserved.

Fig 4 provides (in pseudocode) an algorithm that could be used to implement the process mentioned above. The update process has been compressed into a procedure in which human intervention was not required during the period the record was locked. Note that the record lock action was performed as a command to lock the record and a check for an error return. No test for a locked condition was made first. This is the normal procedure, as the process of testing for a locked condition and then requesting the lock as a separate command leaves a time gap in which the record could be locked by another user. The error check on the lock command still is required; thus, the test is superfluous.

In another situation, one user may be assigned to update salary information

ATLANTIS INTERNATIONAL COMPUTERS

IMPORTERS
SUPPLIERS
DISTRIBUTORS
& SALES

ATLANTIS INTERNATIONAL PTY LTD
49 WADHAM PARADE,
MT. WAVERLEY,
VIC. 3149
PH: (03) 277 3139 277 7187 277 9514
FAX: (03) 277 6824

$895.00
Inc-Tax
$770 x-Tax

NEW RELEASE

STAND NO:
1008

The Australian International
Office Technology Exhibition
O-F-F-I-C-E
TECHNOLOGY
87
ROYAL EXHIBITION BUILDING
MELBOURNE 31 MAY – 3 JUNE 1987

SPECIFICATIONS:

* Turbo Motherboard
* 256K Ram (Expandable to 640K)
* 1 x 360K Disk Drive
* Multifunction Card
* Serial, Parallel, Joystick Ports
* Clock/Calender/Timer
* Battery Back Up.
* Color Graphics Card
* Composite Port
* R.G.B. Port
* Power Supply
* Keyboard XT Style
* Green Screen Monitor
* All Cables & Manuals
* DATACRAFT WARRANTY SUPPORT 3 MONTHS AUSTRALIA WIDE

Note: • Prices Subject to Change at any time
• Offer Valid till 4th July 1987
• Budget PC-Turbo Assembled in Australia.

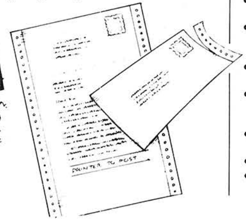
"For Innovative Technology That Eliminates Cumbersome Mailings, Your Business Needs Us Like Australian Post Needed James Raymond."

The Sydney Post Office Seal, was used for the design of an embossed stamp which was impressed on pre-paid stationery sold for use within the boundaries of the local Sydney Post. The embossed sheets were on sale from November, 1838, until 31st December, 1849.

James Raymond was the Postmaster-General of New South Wales in 1839 when the controversial postal reform pamphlet by Rowland Hill arrived in the colonies.

Raymond was quick to obtain approval from the Governor, Sir George Gibbs to adopt immediately, the extremely innovative concept of pre-paid postage. Prior to this, mail was paid by the receiver.

The Australian Post in 1838 owed J. Raymond a vote of thanks for being innovative in introducing the first postage stamp in the world.



Trifold Heat Sealer Equipment

If you have the need to produce documentation e.g. cheques, rates, renewals, in fact any bulk variable mailer, you must be looking for the TRIFOLD "Heat Sealer".

ADVANTAGES:-
- a single part business document that forms its own envelope
- a sealing machine that is portable and suits any business form up to 1 million per annum
- because of it's design it's the easiest to use
- convenient, your own office machine, avoid time-wasting batching
- mail out today — giving improved cash flow
- meets all Australia Post requirements
- glue pattern gives precise, tight seal, thereby enhancing security

Cut Out And Mail Today

I'm interested in learning how to simplify my mailing system. Please send me your free brochure

Name __________

Title __________

Company __________

Address __________

__________ P/C ______

Telephone __________

Fax __________

A DIVISION OF MOORE BUSINESS SYSTEMS AUSTRALIA LIMITED (INCORPORATED IN A.C.T.)
Marketing Services Manager
P.O. Box 180 Richmond 3121 Victoria
Call Toll Free (outside Melbourne) 008 338864
Call (Melbourne & Metropolitan) 819 2711

MOORE

BUSINESS FORMS & SYSTEMS DIVISION

MOORE — AUSTRALIA'S BUSINESS PARTNER and World Leader in Business Systems

Persons or organizations mentioned in this advertisement other than MOORE are meant purely as historical and illustrative purpose, they are not in any way meant to be endorsements

Chances are when you get your new computer, there'll be something missing.

It can take over six weeks for custom produced stationery to arrive. So you won't be able to compute on day one.

Rediform instant computer stationery complements all of the popular business accounting packages for micro's, covering everything you're likely to need from "pre-set" invoices, remittance advices and statements to plain print out paper.

Rediform "pre-sets" have space for your company name, address, phone number and other necessary identification so they're particularly suitable for the small computer user. In the interim or long term.

Clip the coupon for further information or your nearest supplier. And remember, don't leave the computer store without Rediform.

Then you can start on day one.

REDIFORM **Off-the-shelf Computer Stationery.**

☐ Please send me more information on Rediform. ☐ Please let me know where my nearest dealer is.

To: Sales Promotion Manager
Rediform
P.O. Box 180
RICHMOND VIC 3121

NAME __________

COMPANY __________

ADDRESS __________

POST CODE _____ PHONE _____

ANG/RA/841

in employee records, while another user is responsible for updating addresses in the same employee file. Even though the two users do not intend, or are not allowed, to update each other's fields, the data manager may write to the file on a record-by-record basis instead of on a field basis. This type of record management is common in data managers, and the applications programmer must give some attention to the potential for corrupted data. The situation could arise in which both users read the same record, one makes changes to the address field and rewrites the entire record, and the second makes changes to the salary field and rewrites the entire record. The second user's update restores the address to the original value, which, in turn, voids the first user's changes to that field.

DataFlex avoids this problem by performing updates at the field level in the LAN environment, where only those fields changed by the program are rewritten instead of the entire record. Some data managers that rewrite entire records provide a command or function that checks a new record read against the record value last read.

'Semaphore locking mechanisms provide the ability to coordinate access to a resource through the use of a user-predefined signal.'

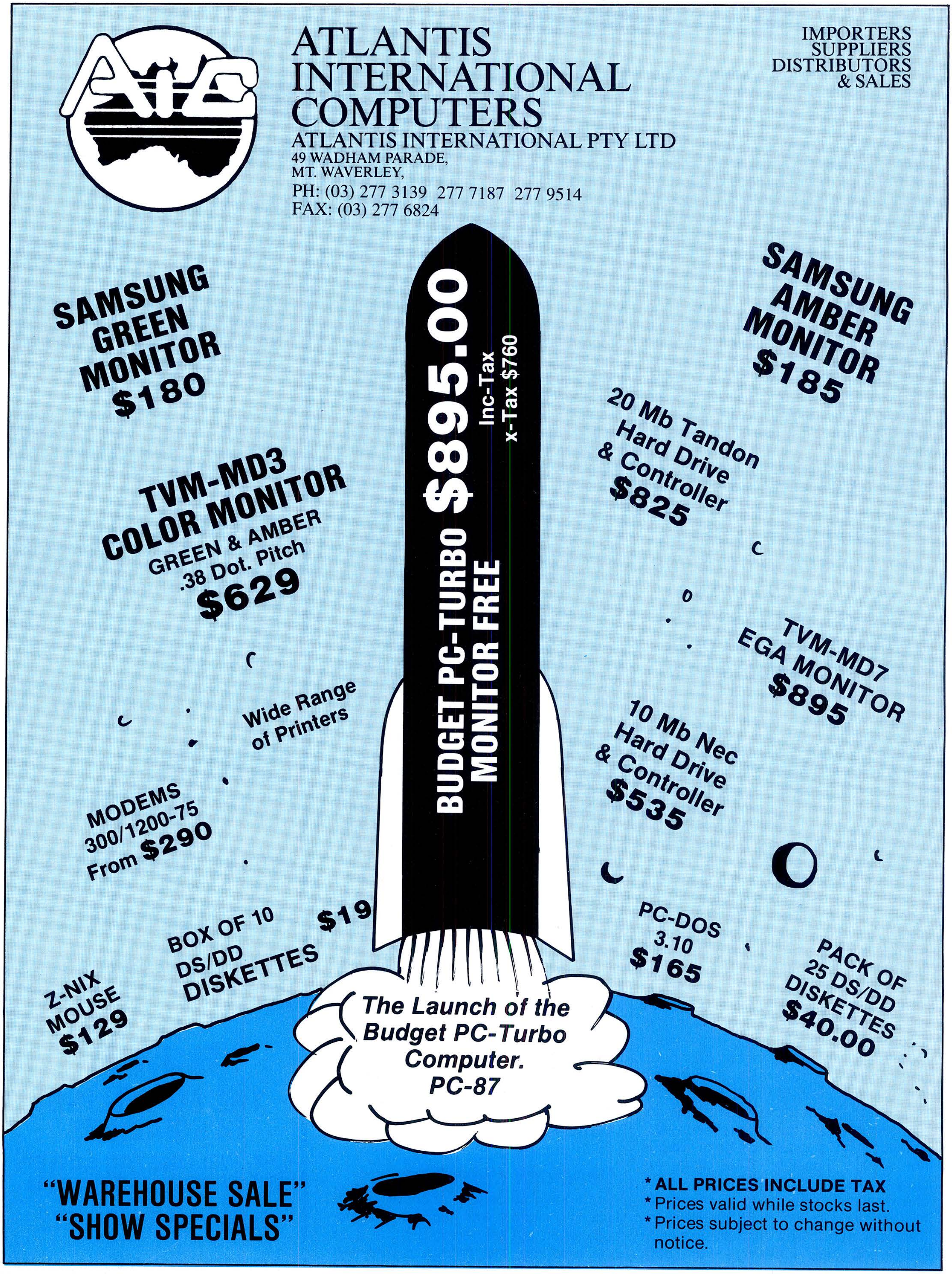
For other data managers a technique called 'signature checking' can be applied. In each record a numeric field called Sig is used to determine if the record were modified since it was last read. As shown in Fig 5, after the record is read, the value of this Sig field is saved. When the clerk is ready to update the record, the record is reread and locked. The signature value is compared to its value when the record was originally read. If the value is different, then the record has been updated by someone else. If the value is the same, then the updates are applied with the confidence that the integrity of the data has been preserved.

Locking on a record or field level is not always possible. The open exclusive file lock is often used when changes are to be made to several or all records in a file, such as file pack (removal of records marked for deletion) and file indexing. For data managers in which indexes are implemented as separate files, changes to data in an indexed field require a change to the index file contents. If two users make simultaneous changes to the same key field in different records of the data file, the corresponding changes to the index file must be controlled to prevent corruption of the index. The data manager normally needs to lock the entire index file while the index pointers are being changed, but the time for this operation is under total control of the data manager. The index update does not occur until the user program attempts to rewrite the record. The data manager then can lock the index file, effect the change, and unlock the file in one operation. The applications programmer need not be concerned that two copies of the data manager may be updating the same index file.

Another consideration for the designer of a multi-user database system on a LAN is the management of data buffers. The objective of record locking, as explained above, is to prevent data from being updated while another user is also updating a copy of the data. Because of the number of different computers and data transmission systems involved, several layers of buffer may be present between the data storage on the file server's disk and the user's application program: the LAN server program may buffer the data stream to or from the disk; the LAN communications boards may include communications buffering; the local user's DOS provides buffers for data in local and remote files being processed using DOS commands; the data manager may provide its own data buffers; and the applications program may accumulate data in memory variables during user input. These are all forms of data buffer, and they all must be managed so that only the correct copy of a data element is updated and stored. Some of these buffers can be controlled only by the operating systems involved, others only by the data manager. The data manager program must request the operating system to flush the buffers to disk before unlocking the record. The applications programmer must be responsible for data buffered within memory variables in application programs.

Deadlock detection

Also known as deadly embrace, 'deadlock' is a circular wait condition that occurs when a user requires more than one resource (file, record, record set)


ATLANTIS INTERNATIONAL COMPUTERS
ATLANTIS INTERNATIONAL PTY LTD
49 WADHAM PARADE,
MT. WAVERLEY,
PH: (03) 277 3139 277 7187 277 9514
FAX: (03) 277 6824
IMPORTERS
SUPPLIERS
DISTRIBUTORS
& SALES
$895.00
Inc-Tax
x-Tax $760
BUDGET PC-TURBO
MONITOR FREE
SAMSUNG GREEN MONITOR $180
SAMSUNG AMBER MONITOR $185
20 Mb Tandon Hard Drive & Controller $825
TVM-MD3 COLOR MONITOR
GREEN & AMBER
.38 Dot. Pitch
$629
TVM-MD7 EGA MONITOR $895
Wide Range of Printers
10 Mb Nec Hard Drive & Controller $535
MODEMS 300/1200-75 From $290
BOX OF 10 DS/DD DISKETTES $19
PC-DOS 3.10 $165
Z-NIX MOUSE $129
PACK OF 25 DS/DD DISKETTES $40.00
The Launch of the Budget PC-Turbo Computer. PC-87
"WAREHOUSE SALE"
"SHOW SPECIALS"
* ALL PRICES INCLUDE TAX
* Prices valid while stocks last.
* Prices subject to change without notice.

```
OPEN Stockfile FOR SHARED UPDATE
DO FOREVER
  PERFORM GetOrder
  READ RECORD WITH Stock.Number = Order.Stock.Number
  LOCK RECORD ON TIMEOUT PERFORM Excessive.Lock.Time
  IF Qoh - Order.Qty >= 0 THEN
     REPLACE Qoh WITH Qoh - Order.Qty
     DISPLAY MESSAGE "Order placed."
  ELSE
     DISPLAY ERROR MESSAGE "Order rejected - insufficient QOH"
  ENDIF
  UNLOCK RECORD
END
```

Fig 4 Record-locking code. The pseudocode above is designed to ensure data integrity. The update process is designed so that the record is locked for the briefest possible time. The record is locked, read, and the update attempted. If the record is unavailable, the system retries for a specified amount of time before failing

```
OPEN Employees FOR SHARED UPDATE
DO FOREVER
  READ Employee.Record
  Check.Sig = Record.Sig
  PERFORM Get.New.Address
  READ Employee.Record
  LOCK RECORD ON TIMEOUT GOTO Excessive.Lock.Time
  IF Check.Sig = Record.Sig THEN
      REPLACE Employee.Record.Address WITH New.Address
      REPLACE Record.Sig WITH MOD(Record.Sig+1,1000)
      DISPLAY MESSAGE "Address Updated."
  ELSE
      DISPLAY ERROR MESSAGE "Record has been changed "
  ENDIF
  UNLOCK RECORD
END
```

Fig 5 Signature-checking code. The record is read and the value of the Sig field saved. When the updates are ready, the record is locked and re-read. If the value of the Sig field has changed, the record has been updated between readings. If the value is the same, the updates are made and the Sig field is then incremented

to complete a task, has locked part of the resources, and is waiting for the remainder of the resources to become available. At the same time a second user has locked a portion of the same set and is waiting for the resource the first user has locked. An example of this situation is the requirement to lock both a parts record and a vendor record to perform a part number and discount change. If the first user locks the parts record at the same time a second user locks the vendor record, the first user must wait for the vendor record to become available before proceeding. Meanwhile, the second user has locked the vendor record and is waiting for the parts record to become available for locking. This is a simple case. Many real cases are more insidious — involving more than two records or users and other files, such as parameter files or other secondary resources.

Once a deadlock condition has been detected, the usual recovery procedure is to choose a victim and abort that user's process, thus freeing up the locked resources for the nonvictim process or processes. Of course, the preferred method of dealing with deadlock is prevention, and three common techniques are available.

If the network, operating system, or data manager provides a service called 'set locking,' then the program simply supplies the operating system with the list of simultaneous resources needed and requests that the set be locked. Then the set is locked only if all resources are available.

Another method to avert deadlock relies upon 'cooperative processing' of all programs accessing the same database. It is agreed that each program will always lock resources in a predetermined sequence. No copy of a program can lock any item on the list unless all previous items have been locked. In this case, the first program to lock the first item on the list is home free because no other copy can get beyond the first item to lock any of the others in the set. This technique counts on each program complying with the agreed-upon sequence. However, some subtle interference between sets of resources required for totally different purposes could take place that still would allow a deadlock condition to occur.

> *'Data managers implemented on LANs from existing multi-user environments. . .often contain security features, sophisticated transaction processing and audit trail capabilities.'*

The 'lock back-off' technique can be implemented through programming structures and provides a secure solution to most deadlock problems. In an application designed to use lock back-off, a program attempts to lock a set of items one by one. Whenever an item cannot be locked, the entire set of locked items is released and the program starts over again after waiting a randomly determined amount of time. This procedure will assure that no process holds resources while waiting for others to become available.

Many data managers offer automatic record locking; some, including dBase III Plus, also caution the applications developer that deadlock avoidance is the responsibility of the programmer. Usually, automatic locking can be implemented by the data manager only in those situations in which user activities are controlled by a direct user DAI provided by the data manager. Also, where a set of multiple resources must be locked during a specific process, as illustrated above, the developer probably needs to incorporate the deadlock avoidance logic into the programs.

The problem of deadlock often arises in 'transaction processing' in which multiple resources need to be locked simultaneously. Some data managers offer direct support for transaction processing and provide services such as transaction logging and transaction back-out to avert the situation.

For an application in which changes to multiple files must be made before others are allowed to use the new data, as in the case of adding a new customer and a simultaneous order for that customer, explicity defined transactions may be used.

The ZIM command 'transaction', for example, marks the beginning of a transaction. During a transaction, any part of the database read is read-locked (others may read, but cannot update) and any portion written is write-locked (others may not read or update). The 'endtransaction' command marks the completion of the transaction; the changes are applied to the database, and the locked resources released. If the transaction cannot be

completed for any reason, 'quittransaction' is used: the transaction is aborted, the pending changes are discarded, and the reserved resources are released.

ZIM uses the 'transaction' and 'endtransaction' commands to detect deadlock conditions in which different users have applied changes to portions of the database and then attempt to lock data within another user's transaction-locked resources. When such a deadlock situation is detected, ZIM selects one of the processes to be the victim, and aborts its transaction, in the process discarding the victim's pending updates as if a 'quittransaction' had been executed. User code is required to test after update or read operations for an error code to determine if the transaction has been completed or not.

A matter of distance

Many factors affect the performance of systems developed using data managers on LANs, including the category of data manager, the location of the database relative to the DBM portion of the data manager, and the type of application implemented. The speed and capabilities of the computer, available disk storage, and LAN hardware also influence overall system performance.

A relational data manager processes substantial amounts of data as it performs joins and table look-ups to produce a data table representing the result of a query. When all data manipulation must be performed by a computer at a LAN node with the data remotely located on a file server's hard disk, the considerable data movement load placed on the LAN can result in a low overall performance. Sophisticated query optimisation techniques can improve the performance of relational data managers, but such methods have just begun to migrate from mainframe data managers down into the microcomputer environment.

The fact that data management systems require the manipulation of large amounts of data places severe demands on the underlying hardware system. Data must be retrieved from mass storage and presented to the data manager for processing with minimal delays. In a stand-alone, single-user system, the close coupling between the CPU and the mass-storage disk provides maximum efficiency for this operation. Also, buffering of both data and index files can substantially improve the system's performance of data access.

'Sophisticated query optimisation techniques can improve the performance of relational data managers, but they are new to micros.'

Many of the performance difficulties in a LAN environment stem from the fact that the DBMs of microcomputer data managers reside at the user node. The effect of the LAN is to insert additional delays and distance between the data on the file server and the processing of the data on the user computer. When data is shared in a LAN environment, the request for data first must be formulated by the user DBM, then translated into low-level system calls, and finally transmitted over the LAN to the server. The data must be retrieved from the file server disk, moved onto the LAN by the file server CPU, and retrieved from the LAN by the user DBM. The buffering of index files becomes ineffective in LAN environments because another user's data changes may affect a shared index file. To assure consistency between the data files and indexes, normally only one copy of the data is maintained at the file server.

True performance breakthroughs in LAN database systems will be possible when the DBM and the DAI can be physically separated. With the DBM located at the file server, thus making it a database server, the DAI on the user computer could pass entire queries to the DBM, perhaps in SQL. The DBM on the database server then would process the query and be able to return only the answer to the query. Oracle Corporation is developing this type of database server for its LAN version. The database server will run under UNIX and will accept SQL queries from user nodes. It is expected that more such database servers will emerge with the availability of multi-tasking DOS.

Other data manager attributes affecting system performance include indexing methods and query techniques. Many microcomputer data managers use B+ trees for storing indexes. Retrieval of data records in index sequence requires that at least two data accesses be made for each data record read. First the index file is queried to locate the pointer to the correct data record in the data file (this actually may take more than one access to find the pointer), then the data record is retrieved. Even when some data managers store the B+ tree index in the data file header, several disk accesses may be required to retrieve a single data record.

Revelation (by Cosmos) uses hashing algorithms for storing data. Because the hash value for a record is com-

puted at the user node and translated directly into a data record location on the file server, only one access over the LAN for data is required in most cases. The efficiency of a hashing algorithm depends upon the choice of the field, field combinations, or field portions selected as the key. A poor key choice can cause excessive collisions. Although the data manager is expected to resolve hash value collisions, each collision will require additional processing in order to locate the correct record. In general, hashing is more suited to applications in which the system, once developed and implemented, does not undergo frequent database structure change and where ad hoc queries and analyses are not common.

Query processing must be as efficient as possible to minimise the amount of data transmitted over the LAN. Data retrieval techniques can be procedural or nonprocedural. With procedural languages, the user provides the data manager with step-by-step directions for retrieving the desired elements and may even perform the joins between files manually. In nonprocedural languages, the user specifies only the set of data to be retrieved and the data manager determines how to acquire the data. The efficiency of procedural techniques depends upon the order in which files are accessed and related to each other; the user must take into account the data structures, relationships, and existing indexes to determine the most efficient method of retrieval. With nonprocedural queries, the user has little or no control over the method used to retrieve the data, and, therefore, must rely upon the data manager to optimise query processing.

One example of data retrieval using procedural techniques would be a dBase III Plus program that employs DO...WHILE loops to extract data from multiple files. Such an application might involve an employee file with related information located in department and salary files. Such a request could incorporate tests to restrict the output to only those employees of a particular department whose employment anniversary falls within a specified month, thus producing a list of persons scheduled for annual performance reviews.

If an index exists that is set up by department number on the employee file, then the entire employee records for other than the selected department can be bypassed by seeking the first employee in the desired department and examining employee records in this index sequence only while the department number remains the one of interest. For each employee record, the date of hire is checked and other information looked up and printed only for those within the date range.

'Query processing, either by procedural or non procedural means, must minimise the amount of data transmitted over the LAN.'

In a nonprocedural query the set of desired employees would be specified to the data manager, which would select an approach to obtain the appropriate records. In Oracle's SQL, such a query might be set up in a format similar to the following:

```
SELECT  EMPLOYEENAME,
        EMPLOYEENO, DATEOFHIRE
        TO_CHAR(DATEOFHIRE,'MON')
        HIREMONTH,
        EMPLOYEES.DEPTNO.
        DEPTNAME,SALARY
FROM    EMPLOYEES,DEPTFILE,
        SALARYFILE
WHERE   EMPLOYEES.DEPTNO =
        DEPTFILE.DEPTNO
AND     EMPLOYEES.EMPLOYEENO =
        SALARYFILE.EMPLOYEENO
AND     EMPLOYEES.DEPTNO = 30
AND     HIREMONTH = 'JAN'
```

Note that no instructions are given to the data manager as to how to join the three tables to extract the desired results. The data manager is free to sort files, to use or create index files, or to create temporary files during the process. The user has not specified any controls that would affect the efficiency of the query evaluation.

Oracle contains an elaborate query optimising method that analyses the SQL statements and computes an efficient order for processing tables based upon the selection criteria in WHERE clauses connected by ANDs and table joins where indexes do or do not exist.

Database distribution

LANs thus allow users to share a central database. The capability to use data extracted from remote databases for combination with data from local databases provides an additional dimension in data management. In large organisations, a central database may hold information common to all departments, whereas each department would store a database of information common to its departmental activity, and individual users also might have local databases for project information. It is necessary to be able to move data in all directions throughout the organisational structure.

A working definition of a distributed database is provided in *An Introduction to Database Systems, Volume II* by CJ

IBM Compatible Under $1000!

Yes! It's a price breakthrough. A top quality, IBM PC compatible computer for less than $1000. Unbelievable... but true!

Cat X-8000

Monitor not included

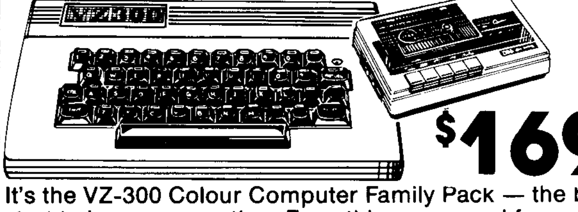
DSE Multitech

Who else could do it but Dick Smith Electronics? With the world-famous Multitech PC500 computer — from one of the largest manufacturers in the world — you get the perfect computer for business, for home, for studies. All the power and performance PLUS the world's leading software range is now within your reach.

Here's what you get:
- 256K memory — fully expandable to meet future needs
- Built-in 360K floppy disk drive (with room for a second!)
- Built-in parallel, serial and joystick ports (the ones others charge you extra for!)
- The very latest MS-DOS 3.2 Operating System (not yesterday's 2.11 system!) compatible with the world's best software range for business, education and games.

Yes, all this under $1000!
Sensational Saving... **$995**

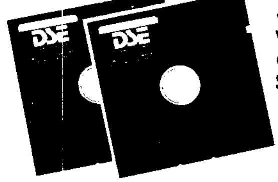
And one for the kids: VZ-300 Family Pack



$169

It's the VZ-300 Colour Computer Family Pack — the best start to home computing. Everything you need for an immediate start is included:
- VZ-300 Colour Computer
- Data cassette for running software and storing your own programs
- 2 game and 2 educational programs. Cat X-7307

Bargain priced quality disks!

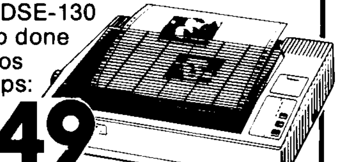


Just what the computer buff wants. Premium double density disks starting from only $2.75 each!

Single sided	Double sided
Cat X-3500	Cat X-3501
$27.50 box of 10	$29.50 box of 10

Faster Printer!

When speed is important our DSE-130 Dot Matrix Printer gets the job done quickly: ideal for letters, memos and reports. Prints up to 130cps: normal, enlarged and condensed styles, plus graphics. Cat X-3230 **$549**



DICK SMITH ELECTRONICS
COMPUTERSTOP

• NSW • Albury *21 8399* • Bankstown Square *707 4888* • Blacktown *671 7722* • Blakehurst *546 7744* • Bondi Junction *387 1444* • Brookvale (Warringah Mall) *93 0441* • Campbelltown *27 2199* • Chatswood Chase *411 1955* • Chullora *642 8922* • Gore Hill *439 5311* • Gosford *25 0235* • Hornsby *477 6633* • Liverpool *600 9888* • Maitland *33 7866* • Miranda *525 2722* • Newcastle *61 1896* • North Ryde *88 3855* • Parramatta *689 2188* • Penrith *32 3400* • Railway Square *211 3777* • Sydney City *267 9111* • Tamworth *66 1711* • Wollongong *28 3800* • ACT • Fyshwick *80 4944* • VIC • Ballarat *31 5433* • Bendigo *43 0388* • Box Hill *890 0699* • East Brighton *592 2366* • Coburg *383 4455* • Essendon *379 7444* • Frankston *783 9144* • Geelong *43 8522* • Melbourne City *67 9834* • Richmond *428 1614* • Ringwood *879 5338* • Springvale *547 0522* • QLD • Brisbane City *229 9377* • Buranda *391 6233* • Chermside *359 6255* • Redbank *288 5599* • Rockhampton *27 9644* • Southport *32 9863* • Toowoomba *38 4300* • Townsville *72 5722* • Underwood *341 0844* • SA • Adelaide City *232 1200* • Darlington *298 8977* • Enfield *260 6088* • Salisbury *281 1593* • WA • Cannington *451 8666* • Fremantle *335 9733* • North Perth *328 6944* • Perth City *481 3261* • TAS • Hobart *31 0800* • NT • Stuart Park *81 1977* B.389/RB

Date (Addison-Wesley, 1983). Date's definition is that "A database is 'distributed' if it can be divided into distinct pieces, such that for a given user access to some of those pieces is very much slower than access to others." Date goes on to specify that each node or site where a piece of the database exists constitutes a database system in its own right, with its own database, its own CPU, and its own local data manager. Control does not belong to a single, monolithic data manager; instead, the individual data managers cooperate in a type of federation, accepting queries from remote sites and returning the requested data to the sites.

One of the goals of distributed databases is the concept of 'location transparency.' The intention here is that the user specifying a query does not need to be aware of the location of the data elements accessed. For example, the SQL query

```
SELECT  PROJECTNAME, PROJECTNO,
        CLIENTNAME, CLIENTNO
FROM    PROJECTS, CLIENTS
WHERE   PROJECTS.CLIENTNO =
        CLIENTS.CLIENTNO...
```

might access a local database for project information with a look-up into a central master client list. The local data manager, but not the user, would need to know that the client list data is remotely located and how to access it. Two methods are available for accessing the client table: the local data manager may request a copy of the table to be transmitted to a temporary local file, or the local data manager may determine the list of clients needed to support the local query and request that the central data manager execute a query to extract the appropriate fields from these selected client records.

Theoretically, it would be best if no data elements were stored at more than one location, so that when a data element was updated, all accesses after the time of update would receive the latest (and, therefore, the correct) value. In most situations, however, this

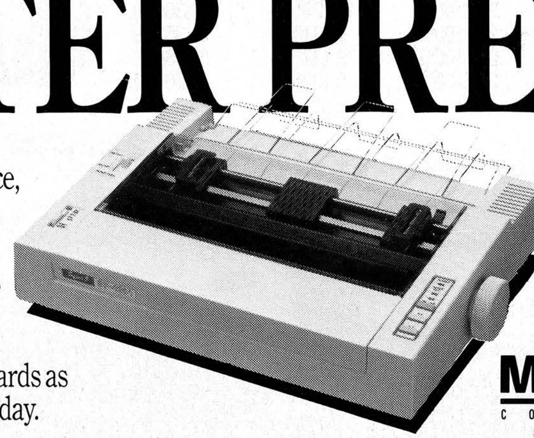
'Distributed database systems, which answer the processing needs of many firms, depend upon developments in the area of connectivity.'

is not practical. Many data elements of an organisational database change infrequently, and a requirement to access this rather static data from a remote location that may be many kilometres away can be expensive and produce intolerable performance. It is normal to replicate some frequently accessed data elements at sites distant from the master copy to improve query performance.

These remote copies must be updated periodically, with the periodicity dependent upon the volatility of the replicated data. For example, an organisation may choose to update the remote copies of its master client list daily and its master employee list weekly. System designs that support replicated data can be quite complex. Queries requesting data that are replicated should access the nearest copy, whereas processes that update replicated data must update all copies in all locations.

Clearly, a distributed database system closely models the data processing requirements of many organisations. The LAN environment provides a structure within which to implement distributed databases on a departmental scale, and micro-to-mainframe links extend the structure to include organisational data. At present, the limiting factor appears to be microcomputer and network operating system capability. Data manager applications executing on one machine need to communicate with applications executing on other machines, and they must be able to do so at a level above simple file or record transfer. An application must be able to formulate and transmit a query to a remote application that will process the query and return the result. Data managers that separate the database management functions from the query and application interface functions will be better suited to distributed data environments than the all-in-one programs currently available.

Thus, the future of distributed database system development depends heavily upon progress in the area of connectivity. Processes that are executing on different computers, whether those machines be micros or minicomputers or mainframes, need to communicate on a process-to-process level. Applications must be able to send messages requesting information from remote applications and to receive the resulting information in a recognisable logical format. The ability to communicate at this logical level reduces unnecessary traffic on networks and communications links, thus improving performance. Ongoing endeavors in connectivity include the introduction of the IBM SNA LU 6.2 interface for inter-applications communications such as IBMs APPC (advanced program-to-program communication) protocol. As connectivity technology



progresses, distributed database management technology should improve as well.

Careful development

Many of the currently available data managers for LANs are updated versions of existing stand-alone microcomputer programs. These products have implemented file- and record-locking features, and some also have provided file- and field-level security. However, many data managers developed specifically for the PC environment have concentrated on the user interface and ease of use, to provide a competitive edge in marketing and advertising. Upgrades to these products for use on LANs provide limited additional functionality and minimal design and modification specifically oriented toward LAN performance and data integrity issues.

Data managers implemented on LANs from existing multi-user environments such as minicomputers or mainframes, on the other hand, often contain security features, sophisticated transaction processing and audit trail capabilities. These products generally are more suited to the professional developer than to the end user because of their complexity; they lack the ease of use of the stand-alone variety.

Database systems generally are implemented on LANs to provide the capability of sharing common data. These systems require attention to design detail, careful implementation of data locking and transaction processing logic, and ongoing management of data integrity. Ad hoc end-user development of database structures may be suitable for many stand-alone applications, but effective and efficient LAN database system design and implementation still require the efforts of professional systems designers and applications developers.

Various data manager designs and implementations perform at differing degrees of efficiency in the LAN environment. Many desirable features, such as location of the database management section of a data manager at a file server to provide database server functions, await improvements in DOS to provide access to additional server memory resources and efficient multitasking of file server computers. Continuing progress in connectivity technology and the emergence of standards for logical inter-application and inter-system communications will affect the design of future multi-user and distributed database managers.

END

Caught in the net

When one standalone system isn't enough, the alternative is a choice between networked PCs and a multi-user system. Peter Malcolm describes the two options and helps you decide.

There comes a time in many computer users' lives when they realise that one single PC can no longer satisfy their computing needs. Even in situations where there are a number of PCs working separately, the user may discover that they spend much of their time swapping files or moving cables around to share resources such as printers. At this time, many will be tempted to link up their PCs into a network, or start again by installing a multi-user system.

Deciding between these options is far from easy, and the distinction between networks and multi-user systems has become less clear than ever. Nonetheless, there are important distinctions in both their operation and their suitability for different tasks.

To make matters more complicated, the two are often interlinked, with hybrid systems encompassing features of both. This adds to the difficulty of specifying a suitable hardware and software solution. In this article, I'll outline the theoretical and practical differences, and go on to discuss what determines the most effective solution in a number of situations.

The bare essentials

In my last article (*APC*, March) I discussed the technical operation of local area networks in detail. The concept of a network is perhaps best described as a roundabout.

Data can enter and leave at any point, and it therefore follows that data from one station on the network can be directed to be received by any other station. Stations may be printers, disk storage, PCs or whatever. In a network system each and every station has some form of processor, and the network is simply used as a means of transferring data between stations. Thus, each user on a network will have his own PC.

In a network system, the speed of processing and the use of local resources is quite independent. A user can only feel the effect of others on the network while transmitting or receiving data on it.

At its simplest, a multi-user machine is a single, central processor to which a number of input/output devices are connected. Each user has a terminal whose only purpose is to send information to the processor (from the keyboard) and to display information from the processor (on screen). In general, all mainframe and minicomputer systems use this concept. A multi-user machine allocates an amount of its central memory to each user and time-slices the use of the processor for a short period (typically one machine code instruction) before control of the processor is passed to the next user. Time slicing involves each user having complete control over the processor before it is passed to the next user. Time slicing is controlled by the operating system, and is user transparent.

Mainframe systems are able to weight time slicing according to a user's priority rights, but this technique is not used in multi-user micros. Thus, the multi-user machine consists of one central resource (however simple or complex) with a number of input/output devices (terminals, printers, and so on).

Each user is, therefore, continuously affected by other users on the system, and the speed of processing of each terminal and the availability of resources to each user depends on the processing and resource requirements of other users. In general, the speed of operation degrades in proportion to the number of users.

Consequently, a mainframe processor with hundreds of users must operate proportionately faster than a mini system with tens of users, or a micro system with only a handful of users.

Networked micro systems

In practice, micro networks fall into two categories. A high proportion of installations simply use the network to link a number of PCs to a single file server, to enable all the PCs to share the data stored on the server's hard disk. A typical situation would be where several PCs are used for a shared accounting system — data is held centrally so that the PCs can each use it.

A more complex micro network often evolves where a number of PCs used for separate tasks are linked together to share expensive resources like printers or telex links, or to send messages between users such as in an organisation with many PCs used in different departments. In this situation there may be no shared data source at all: users may have their own disk storage, and use the network only to send data to shared resources or to other users.

Multi-user micros

Multi-user machines are becoming increasingly available, particularly at the cheaper end of the market. However, a large proportion do not fall strictly within the concept I have presented.

What is common to virtually all the systems is that the user has a terminal without any local processor. Processing is done within a central unit to which every terminal, printer and any other I/O device is connected, and it is within these central units that the differences between systems become apparent.

Some systems adhere to the basic concept of a single, shared processor

and use various processors from the 8088 to the 80386. The power required is determined by the number of users on the system and their individual processing needs. Clearly, attempting to connect more than a few users to a single 8088 processor is going to result in very slow operation, even if each user's needs are minimal.

Using an 80386 processor, however, will vastly increase the possibilities — not to mention speed — if only one or two users happen to be using the system.

A significant proportion of multi-user machines are in fact multi-processor: that is they employ more than one CPU. There are two common variations on this. The first is to have one master processor with a number of slave processors — say, one for every four or so users. It has clear advantages in that each user is only competing with a maximum of three other users, and performance can be improved by adding more slave processors so there are fewer users per processor. Reducing the number of users per processor often enables unused ports to be connected to additional printers or other serial devices.

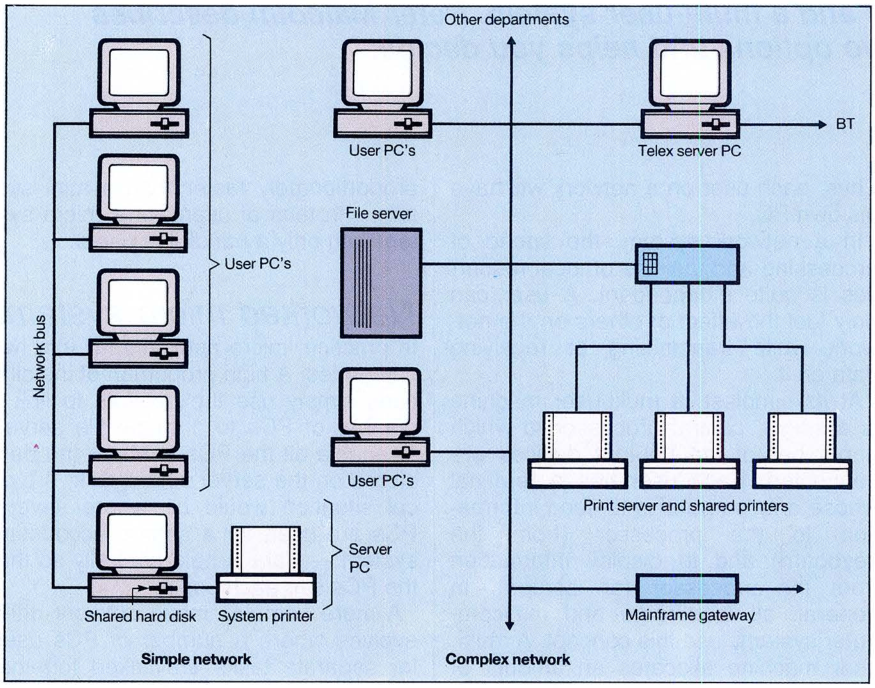


Fig 1 Simple and complex networks

Master and slave

The second multi-processor variation is to use one master processor and install a slave for each and every station. (This is equivalent to having only one user per slave in the previous variation.) Here, every user's processing is independent so speed never degrades (or improves). All North Star machines fall into this category.

In both multi-processor variations, the processors usually communicate with each other using an internal close-coupled network. Because of the short distances involved, and the fact that a physical bus can be used to connect the processors rather than cable, the close-coupled network is able to run faster than the normal external variety.

Will my software run?

Obviously with a network system, each user station (that is, each PC) will run any software which runs on that standard of machine. So if you use an IBM PC compatible, all software designed for that PC will run.

Unfortunately, this is virtually never the case with a multi-user micro. With one exception — North Star machines

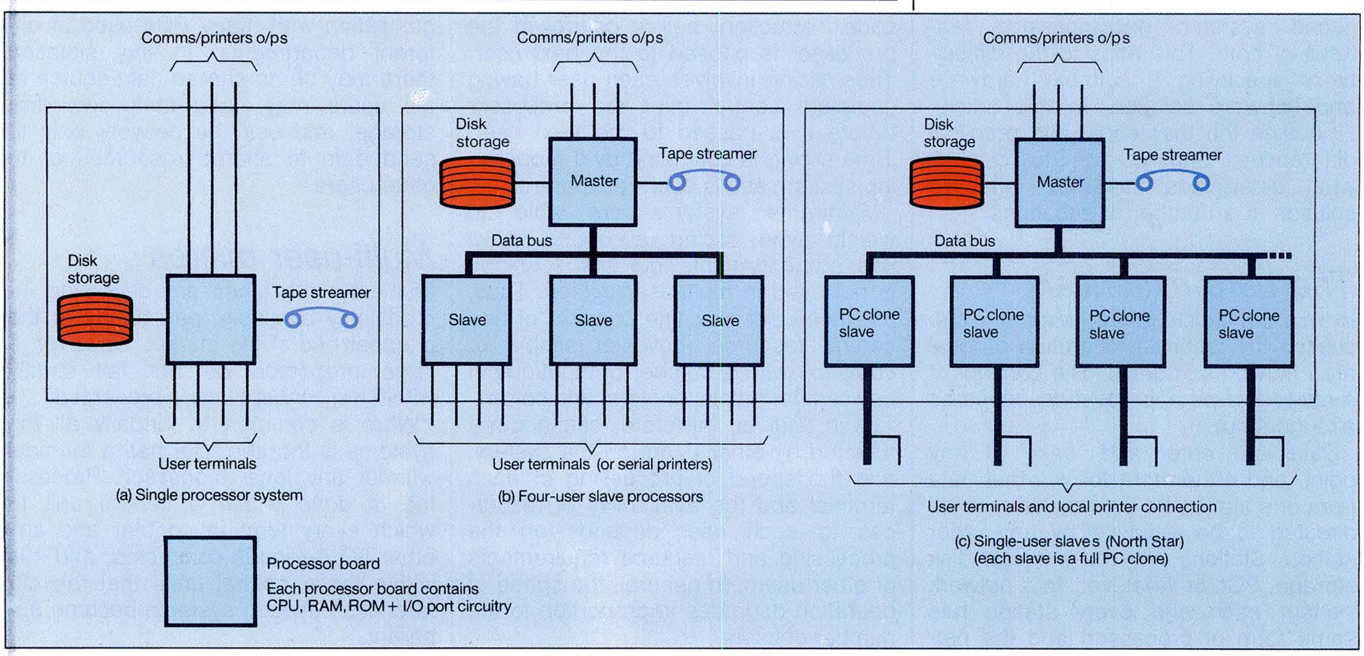


Fig 2 Multi-user variations

Dac Easy Accounting

THE ALL NEW ENHANCED PACK

Now only $199.95

A GREAT PRODUCT FOR A FAIR PRICE

It was only a matter of time until somebody (LIKE US) was fair about the price of software.

No one in their right mind will spend over $3000 for a standard accounting package when they can get virtually the same thing for 1/10th THE PRICE.

Dac Easy Gives you Seven Full Feature Accounting Modules In A Single Integrated Package. Accounting software doesn't have to be expensive to be the best. Dac Easy gives you a fully integrated accounting system with instant access to General Ledger, Accounts Receivable, Accounts Payable, Inventory, Purchase Order, Billing and Forecasting. Imagine, you can generate over 300 reports from 80 different routines ... all in a non copy protected package. And, with Dac Easy you'll get a handsome slipcase binder with easy-to-follow documentation. Best of all, Dac Easy Accounting can be used to manage either service or product oriented businesses.

Find out for yourself why Dac Easy is the fastest selling accounting package on the market. Compare Dac Easy's features against other packages costing thousands more. Then order your Dac Easy Accounting by phoning your nearest stockist or returning the coupon below.

General Information
- Menu driven
- Password protection
- File capacity limited only by disk space
- Support contract availability

General Ledger
- Unlimited # of accounts with multi-level accounting, unlimited departments
- 3 Year account history for CRT inquiry
- Pencil & pen feature to correct mistakes without reverse entries
- Unique budgeting routine (see Forecasting)
- CRT transaction inquiry, unlimited journals
- Activity report, trial balance, financial statements, etc.

Accounts Receivable
- Open invoice or balance forward
- 7 Customized columns for aging report
- Unlimited # of customers
- Mailing labels and directories with 4 different sorts
- Automatic finance charges
- Supports partial payments
- 3 Year customer history for # of invoices, sales, costs, and profits
- Customized text on statements
- Cash flow analysis
- Sales analysis
- Automatic sales forecasting by customer, salesperson or customer type

Accounts Payable
- Cheque printing and up to 10 invoices paid per cheque
- Automatic allocation of available cash to payables
- Vendor directories with sorting by vendor code, name, or territory
- Aging reports with 7 customized columns
- Unlimited # of vendors
- Mailing labels with 4 different sorts
- 3 Year vendor history for CRT inquiry and printing
- Flexible payment calendar
- Automatic forecasting of purchases
- Unlimited allocations per invoice

Inventory
- Supports average, last purchase, and standard costing methods
- Powerful physical inventory routines
- Accepts any unit of measure like fractions/dozens/gross/hours/minutes, etc.
- Automatic changing of costing methods
- Time and product inventory
- 3 Year product history in units, dollars, cost, and profits
- Automatic forecast of product sales
- Automatic pricing assignments
- Alert and activity reports with 11 sorts
- CRT shows on-hand/on-order/committed/sales/cost/profit/turns/GROI

Purchase Order
- Usable for inventory and non-inventory items
- Allows up to 99 lines per purchase order
- Per line discount in %
- Purchase Order accepts generic discounts/freight/taxes/insurance
- Purchase Order accepts back orders & returns
- Purchase journal
- Automatic interfacing with General Ledger, Payables, and Inventory

Billing
- Invoicing on plain or pre-painted forms
- Prints sales journal
- Automatic updating of committed products in inventory
- Ability to customize invoice for remarks
- Allows return credit memo
- Interfaces with Inventory, Accounts Receivable and General Ledger

Forecasting

Unique program that automatically forecasts using your 3 year history
- Forecast revenue and expense accounts
- Forecast vendor purchases
- Forecast customer sales, cost, and profit by customer or salesperson
- Forecast inventory item usage by 4 automatic methods
- Forecast by same as last year, or % base from last year, or trend, or line analysis method

Minimum Hardware Requirements: IBM (PCjr. PC, XT or AT) or other compatibles. 128K memory, one 5¼ DSDD floppy disk, 132 column printer or 80 column printer in compressed mode, 80X24 CRT, MS-DOS[1] PC DOS[1] 2.0 or later.
[1] Trademarks of International Business Machines. [2] Trademark of Microsoft Corporation.

HOW THE EXPERTS RATE DAC EASY

		1	2	3	4
Infoworld	Best Software	☑	☐	☐	☐
PC World	Trendsetting Accounting Product of the Year	☑	☐	☐	☐
PC Magazine	Dac Easy is a genuinely amazing deal.	☑	☐	☐	☐
Business Software	I enthusiastically award four starts and recommend the purchase of Dac Easy	☑	☐	☐	☐
PC Week	I've never before in a review come right out and told readers to buy a product but I'm doing it now. Dac Easy is an incredible value.	☑	☐	☐	☐
Personal Computing	Dac Easy offers the versatility and flexibility real accounting demands.	☑	☐	☐	☐

SYDNEY
Mace Software
122 Arthur Street,
North Sydney 2060
(02) 922 4344

BRISBANE
Mace Software
23 Sylvan Road
Toowong Qld. 4066
(07) 870 3600

MELBOURNE
Tamiym Pty Ltd
390 Burwood Highway,
Hawthorn Vic. 3122
(03) 819 1228

PERTH
Country-Wise
10 Boag Road
Morley W.A. 6062
(09) 275 7977

MACE-SOFTWARE Land St., & Sylvan Rd., Corner, Toowong (Brisbane) Qld. 4066. Phone (07) 870 3600
Simply send in this coupon with the correct amount. Plus **$7.50** for Courier.

☐ BANK CHEQUE ☐ MONEY ORDER ☐ BANKCARD ☐ VISA ☐ MASTERCARD

Account No. ____

Name ____ Expires ____

Address ____ Postcode ____

City ____ State ____

Phone ____ Signature ____

MAIL ORDER PRODUCT REQUIRED (TICK APPROPRIATE BOX)

☐ Dac Easy Accounting **$199.95** ☐ Dac Easy Base **$220** ☐ Dac Easy Tutor **$49.95**
☐ Dac Easy Mate **$99.95** ☐ Dac Easy Port **$99.95** ☐ Dac Easy Word II **$109.95**
☐ Pop Up **$69.95**

MACE-SOFTWARE Guarantees that claims & features listed in this advertisement are true and provide a money back guarantee per license Agreements.

Space-Saving, Two-Piece Printer Stand

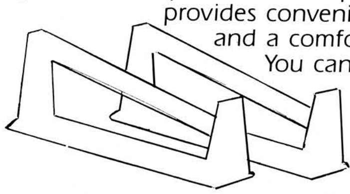
PSI

UNIVERSAL PRINTER STAND

Quickly adapts to all printers and portable computers

NO ROOM FOR YOUR PAPER??

The PSI UNIVERSAL PRINTER STAND is designed for the home or office with limited work space. Our unique two-piece construction is both durable and stable. Adjustable to fit all printers and portable computers, the PSI printer stand provides convenient paper storage and a comfortable viewing angle. You can even stay seated and see what you're printing.



I wish to order ____ PSI UNIVERSAL STAND(s) AT $39.95 each

☐ Cheque enclosed for $ ____________

Please charge the total amount of $ ____________ to my Credit Card Account No.

☐ VISA ☐ MASTERCARD

☐ BANKCARD ☐ AMERICAN EXPRESS

Expiry Date of Card: ____________

Name: ____________

Delivery Address: ____________

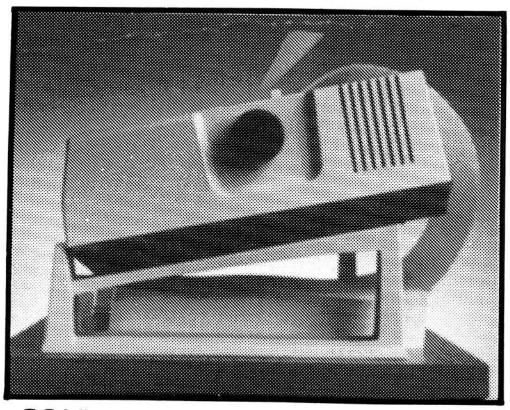
____

Telephone No: ____________

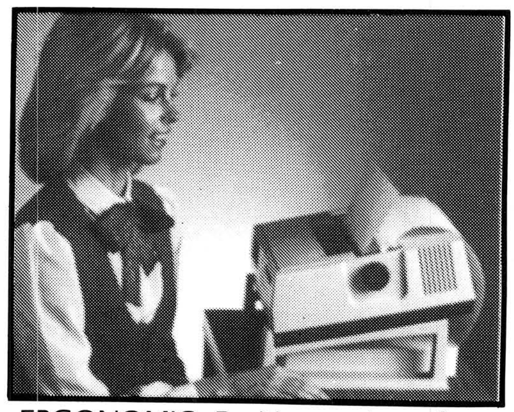
Date of Order: ____________

Signature: ____________

NOTE: Prices include insured delivery within Australia only. All orders are subject to acceptance and stock availability. Please allow 2-3 weeks for delivery upon receipt of orders.



CONVENIENT. Open design allows access to all sides, and accommodates center or back-feed printers.



ERGONOMIC. Positions printer for optimum viewing angle while seated. Foam pads absorb vibrations and noise, while recessed rubber feet eliminate sliding.

ONLY 39.95

Cost effective Multiway 256K Printer Buffer

Increases hourly productivity, freeing operator to do other tasks while buffer stores material while printing.

$399

Write for free brochure of hardware and software lines available.

PSI

THE NEXT MOVE . . .

IS YOURS

HARDWARE/SOFTWARE 'TOTAL SUPPORT'

PROFESSIONAL SYSTEMS INTERNATIONAL LIMITED

5 HOLLAND COURT, HIGHTON, VICTORIA, 3216. PHONE (052) 434340

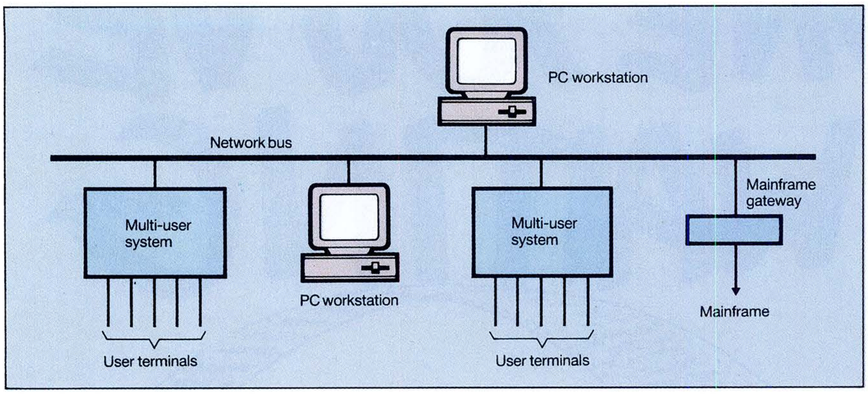


Fig 3 Networked multi-user system — other servers could be connected.

— no multi-user micro is truly IBM PC compatible. A multi-user micro cannot run any software which is machine dependent — that is, makes calls outside the operating system. A good example is Lotus 1-2-3 which, to improve speed, directly addresses the PC's memory-mapped display rather than sending characters via PC-DOS. No multi-user micros (except North Star's) use memory-mapped displays; they simply send character strings to a terminal. In fact the terminal itself does memory map the display, but there is no way of accessing this memory directly.

Thus, packages like Lotus 1-2-3, Symphony and clever word processors like Microsoft Word will not run on a multi-user micro. In addition, anything remotely connected with line graphics or windows is a non-starter. Windowing software works by saving that area of the screen which will be over-written by a new window so that the display can be restored when the window is closed. Unless you can directly read and copy the display memory, this is virtually impossible. RAM-resident utilities like SideKick which make calls to both hardware interrupts (like the keyboard) and to the screen display (to display the SideKick window) will not work either.

Multi-user micros can generally use a variety of terminals, the more sophisticated of which have extras like built-in calculators, and user-defined keys where a string of characters can be produced from a single keystroke. These may be some compensation for the loss of RAM-resident utilities.

Software that *will* run on multi-user machines displays text and block graphics through the operating system and doesn't make machine-dependent hardware calls. Therefore, most accounting systems work fine, as do word processors like WordStar. In spreadsheets you can use SuperCalc II (but not III) and MultiPlan. Most database software works without difficulty.

As multi-user micros do not have local disk drives, they can have problems with copy protected software which uses 'key disks', and any software which controls installation on a hard disk may also prove difficult.

Remember also that with a multi-user micro, disk drives are always shared, and they may not be in the same area as all users, which could prove difficult if your application requires constant use of floppies.

Operating systems

Most multi-user systems use variants of Digital Research's Concurrent DOS, although the North Star uses PC-DOS/Netware.

Those who think that these multi-user operating systems will offer access to unlimited memory will be sorely disappointed. The most widely used version of Concurrent DOS, Version 4.1, can only address a maximum of 1Mbyte of RAM. This effectively limits the number of users per processor. Four users will get less than 256k each (after DOS has had its slice), and this is about the minimum needed for most applications these days.

Higher amounts of RAM per user are available on systems using slave processors, in which case it is possible to approach 1Mbyte of RAM per terminal by having only one user per slave (each slave has its own copy of Concurrent DOS), or a bit less than 512k each with two users.

A new operating system, Concurrent DOS XM (Extended Memory), can address up to 16Mbytes giving greatly improved scope. All the manufacturers using Concurrent DOS provide means of loading and running PC-DOS software within the limitations described above of screen and keyboard addressing.

Concurrent DOS also often enables you to carry out several simultaneous tasks on one workstation at a time, which sounds like good news until you realise that each task needs its own memory; making it of questionable value in practice unless each user has large amounts of memory.

Network systems employ network operating software, like Microsoft's MS-Net or Novell's Netware, which enable shared software packages to run on several stations without conflict, and to establish standards for data access. Many software houses are now making their products available for the most common network operating systems.

Multi-user micro manufacturers have adapted their systems to use this same method, producing a hybrid environment in which the software runs. Multi-processor machines using close-coupled network techniques need a network operating system by definition. The most common is Digital Research's DR-Net (simply because most systems use DR's Concurrent DOS). North Star systems use Netware or 3Com Ether Series operating software.

Hardware hybrids

It is common in a network system to employ 'servers' to give access to shared resources like printers, hard disks and other devices in addition to the local resources available to each PC. On a multi-user micro too, shared ports can usually be configured for either printers or communication devices such as modems.

Conversely, some multi-user micros allow local printers to be connected to the auxiliary port of the terminal, but otherwise all other resources are shared. Using the terminal's auxiliary port involves sending an escape sequence to redirect data, and drivers are necessary to use these local printers with standard software packages. Not all manufacturers provide these.

Multi-user micro manufacturers are increasingly providing a network option with their machines, enabling several multi-user machines to be networked together. In a multi-processor machine, this is simply extending the close-coupled network externally.

This may provide an expansion path for an otherwise fully expanded system, but I can foresee potential problems with software compatibility in such an arrangement.

Pulling the plug

With a network solution, each PC station has its own local power controls, and in general the network will continue to function with or without power applied to individual user stations.

With multi-user micros, local power controls are limited to the terminal's on/off switch. This has advantages in that turning power off does not actually affect processing: generally you can't, for example, crash the hard disk by running off a terminal.

With a network system, however, you could make a shared network disk inconsistent by turning off your PC midway through writing. When a file is written to disk, the data areas, the file allocation table and the directory of disk files are generally all modified. If one of these areas is modified without the others, then the disk may become inconsistent and data may be lost either immediately or on some future write operation.

With a multi-user micro, switching off the central unit will kill off all users, and hence most central units have key-operated power switches. But extra safeguards are needed so that the power isn't disconnected at the wall socket.

Setting up

For ease of installation, a multi-user micro wins every time. Installation is usually a simple matter of plugging everything together and switching on. A network will certainly be more complex, requiring internal modifications to the PCs, installing and checking operating software, and possibly even the reformatting of hard disks.

But while many multi-user manufacturers advertise their systems as plug in and go — and most multi-user operators have their systems up and running fairly quickly — this may be a little optimistic. Many ignore the time it takes to install.

Shared software — that is, software which supports multiple users simultaneously, irrespective of whether the hardware is a network or a multi-user micro — is generally relatively easy

EGA Experts' opinions on the EVA display adaptors

PC Technical Journal: (Awarded Best Computer Magazine by Computer Press Association)

"All of the boards (Paradise's Autoswitch, Video 7's Vega,....) presented here perform adequately for EGA functions, one clearly outshines the others; Tseng's EVA" — Nov. 1986.

PC Magazine

"A superb EGA card" — Oct. 1986
1986 Graphics Hardware Technical Excellence nominee — Nov. 1986.

NEC Home Electronics Inc., USA

"Encompassed more capability per dollar than any other board we evaluated... best met the design philosophy of the MultiSync monitor". Jan. 1987

EVA/480 APPLICATIONS:

CAD/CAM/Graphics Presentation

EVA/480 offers AutoCAD and Dr. Halo in EGA (640 × 350) and PGA (640 × 480) or 720 × 512 (higher resolutions on future EVA Adapters) with hardware window, hardware zoom and smooth panning in window. It more than pays for itself in your first project by just saving the engineer's design time.

Spreadsheet

If you are satisfied with Lotus 1-2-3, it is because you have not used Tseng EVA/480. 132-column × 44 lines spreadsheet is just the beginning. With hardware window and smooth panning on EVA/480, EGA and Lotus 1-2-3 will be much more valuable! If you are a serious Lotus 1-2-3 user, you will be happier with EVA/480.

Mini/Mainframe Communication

For serious computer user, PC-Mini/Mainframe communication application is a definite possibility. Tseng offers proven display adapter hardware and software supported by virtually all major PC - Mini/Mainframe data communication companies such as DCA (IRMA), CXI, Persoft and AST ... Tseng is the trusted display company for data communication.

Word Processing

EVA/480 offers 60-lines or 132-column display for word processing package including Word Star, Word Perfect. The EVA/480 hardware window can be easily programmed to show secondary documents or user interface with smooth scroll to make learning and using word processing programs easier.

Window and Multitasking

EVA/480 supports Microsoft Windows in 640 × 480. The EVA/480's window capability can also be used to display background processing information efficiently and reliably since hardware window requires minimal programming and no data transfer. With little software modification, future higher resolution EVA display adapters will accomodate 1024 × 1024 Microsoft Windows. EVA display adapters' EGA compatibility and growth path is what all display adapters should offer.

Desktop Publishing

EVA/480 includes the popular Dr. Halo II package for graphics presentation and desktop publishing. Halo's DPE (optional) Desktop Publishing Editor software and interface with Aldus' PageMaker and Ventura's Ventura Publisher Edition will provide full graphics and text desktop publishing. The ET2000 has the most powerful EGA graphics(1280 × 1024 or beyond) and text capabilities to meet the needs of desktop publishing.

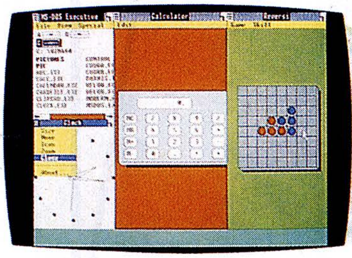
Also available:
EVA/3505 — World's most powerful EGA card
V/P short — low cost Hercules 132 column
Ram VIEW — Hercules, 132 column, CGA, 2048 soft characters.

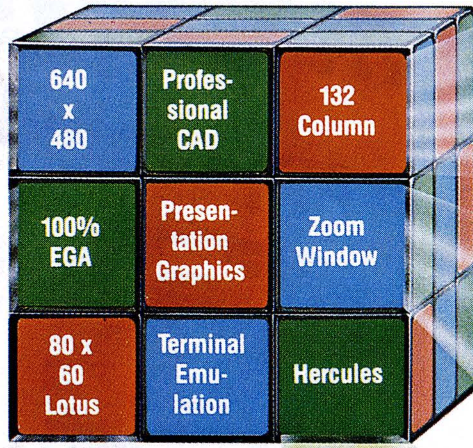
TSENG INTERNATIONAL LTD.
Rm. 7-2 No. 12, Lane 222, Tun Hwa N. Rd., Taipei, Taiwan, R.O.C. Tel:(02)713-9974
Telex:29609 TILTWN Fax:886-2-7121075

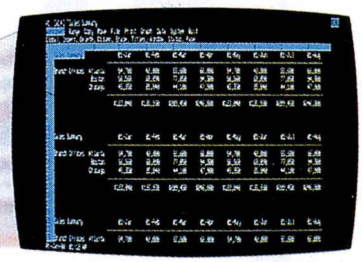
Distributor/OEM/VAR enquiries invited

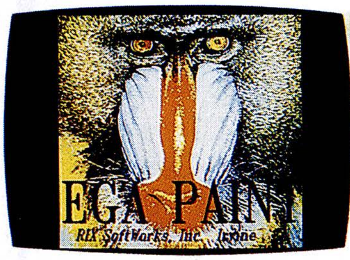
The New EGA Generation

POWER: Hardware Window, Hardware Zoom, Co-processor……
RESOLUTION: EGA (640 × 350), PGA (640 × 480) and 720 × 512……
TEXT: 80/132 Columns × 25/28/44/60 Lines
MULTISYNC: NEC GB-1 MultiSync Display Adapter Compatible

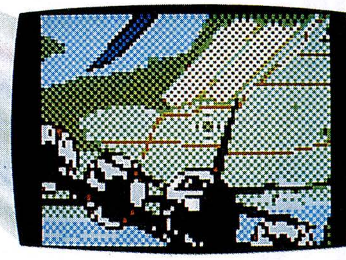

1. MS Window 640×480



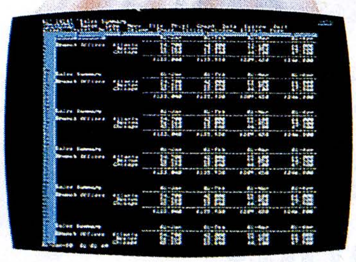

4. 132 Column EGA

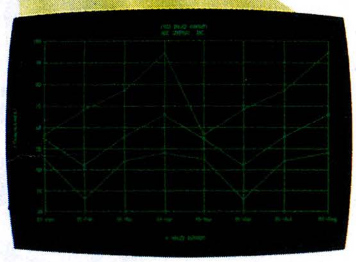


2. Guaranteed EGA Compatibility


5. Dr. Halo Zoom Window in EGA or "480" Mode

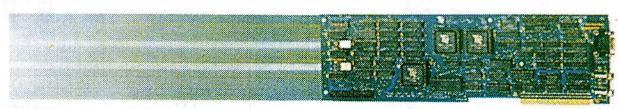
Free Drivers
Auto CAD
M/S Windows
Lotus 1-2-3
Dr Halo II
(full package)


3. 80×60 Lotus Spreadsheet in "480" Mode


6. Hercules Compatible

Available from:
NEC Home Electronics (Australia)
or Tseng's Authorized Distributors.

Eva™/480 MORE THAN JUST HIGHER RESOLUTION!



■ **Extended EGA**
EVA/480 is based on Tseng Labs' ET2000 VLSI Chips providing EGA (640 × 350) and PGA (640 × 480) or 720 × 512 resolutions. All resolutions maintain EGA compatibility to assure software availability.

■ **MultiSync Compatible**
EVA/480 is fully compatible with NEC's GB-1 MultiSync display adapter. It also supports NEC MultiSync monitors and compatibles.

■ **Flexible Text**
60 lines × 80 columns full page display or 132 columns × 25/28/44 lines display for Lotus 123, Word Perfect….

■ **Hardware Window & Hardware Zoom**
Zoom your screen 10 times faster with smooth panning! Hardware window and hardware zoom make your Auto CAD, Versacad, Drafix, Prodesign and Dr. Halo etc fly. EVA/480 is much more than just higher resolution!

■ **Mini/Mainframe Connections**
EVA/480 offers the most proven DEC, IBM terminal emulation capabilities with 132-column display supported by DCA (IRMA), CXI, Persoft, AST……

■ **Reliable Compatibility**
EVA/480 offers reliable hardware emulation for CGA and Hercules (all modes are software switchable). It maintains the same reliability as you add math co-processor or RAM-resident programs. EVA/480 includes a co-processor for versatile emulation of old and future display specifications.

■ **Best Technologies**
EVA/480's VLSI custom chips, adapters, BIOS and standard utilities drivers are 100% designed in USA by Tseng Labs., a US public company since 1984. Our main customers have been corporate and military institutes that demand the best. Tseng, the leader in technology.

to implement. Of course the packages must be designed to run under a multi-user or network environment, and they must further be compatible with the operating system or network operating software the system uses.

Given that hardware and software are compatible, multi-user software will generally run equally well on either a network or a multi-user micro.

Running existing single-user packages in a shared environment (network or multi-user micro) can, in fact, cause a surprising amount of difficulty.

Data security

The major problem with any shared data system is that two or more users may try to write to the same data area at the same time. The result is a mixture of two sets of data and often reduces the entire volume to garbage — even areas that were not being written to — as the directory area of the volume may be damaged, making access to any file impossible.

For example, writing a file to disk consists of three write operations: writing the data; changing the disk space allocation table; and modifying the disk directory. Should another user begin a write operation midway through storing the file, then the disk areas it sees as free may in fact be used, but the space allocation table is as yet unmodified to reflect this.

To protect against this, networking and multi-user operating systems provide for file and/or record locking. File locking ensures that only one user has write access to a file at a given time, and record locking ensures that only one user has write access to a given record at any time.

Single-user operating environments, such as MS-DOS/PC-DOS, are not true multi-user operating systems, although extensions have been added to versions of DOS from 3.1 upwards which provide some multi-user capability. Xenix and Digital Research's Concurrent DOS are genuine multi-user operating systems, and the problems of multiple writes are significantly reduced.

One solution to the problems of using single-user packages in a shared environment (network or multi-user) is to allocate each user a data volume to which only they have write access, and to place actual program files in a shared read-only volume. However, this solution may not work if the program requires write access when loading, as some of the more complex packages such as Microsoft Word do.

This solution pre-supposes that your hardware enables you to create multiple volumes on a single physical drive. Virtually all network file servers do, but this may not be the case with multi-user micros. It is important to make the distinction between volumes — that is, virtual disks which are allocated different drive identities — and sub-directories, which share disk space allocation tables and hence are not suitable for use as separate data areas.

Choosing a system

The choice of a networked or multi-user solution depends not only on hardware requirements such as number of users and memory, but also on the applications of the system. It has to be said that a network will do virtually everything a multi-user micro will do (and much more), and it is therefore unlikely that an application could be solved by a multi-user micro but not by a network.

The only reasons for specifying a multi-user solution over a network are simplicity, reliability and cost. A network may not, however, be the most effective solution to a particular problem.

The cost considerations can be calculated quite simply, and a multi-user micro solution is generally cheaper than its equivalent in a network. The cheapest network PC station using a cheap clone is unlikely to cost less than $3000 including the network interface card and connections; whereas a terminal can cost as little as $1500, needs only simple RS232 cabling and will be more robust.

However, where there are already a number of PCs installed, a multi-user solution is unlikely to be cost effective unless the user needs immediate expansion for a specific task. Even here it is likely that the best multi-user system would be one with the ability to network PCs.

Networks and multi-user systems also address different software needs. Some applications such as accounting systems need multi- user software ability, while those which are used independently such as word processing and spreadsheets work perfectly adequately on networks, even though many users may have access to them.

A given operation in an accounting package is likely to modify only a section of stored data at a time, such as a single customer's record. During word processing or spreadsheet manipulation, however, the whole model is loaded, modified and then written back later — thus the same data is not modifiable by users simultaneously.

Choosing the right solution

There are three basic reasons for choosing a network solution. Firstly, if you require capacity for more than about 20 users; secondly, if your users require anything above the most basic facilities — for example, IBM compatibility, graphics, add-on boards, and so on; and thirdly, if you require to link a number of existing PCs.

A network solution will give you great flexibility, but is therefore considerably more complex. It will almost certainly be more expensive and require more in the way of management once installed.

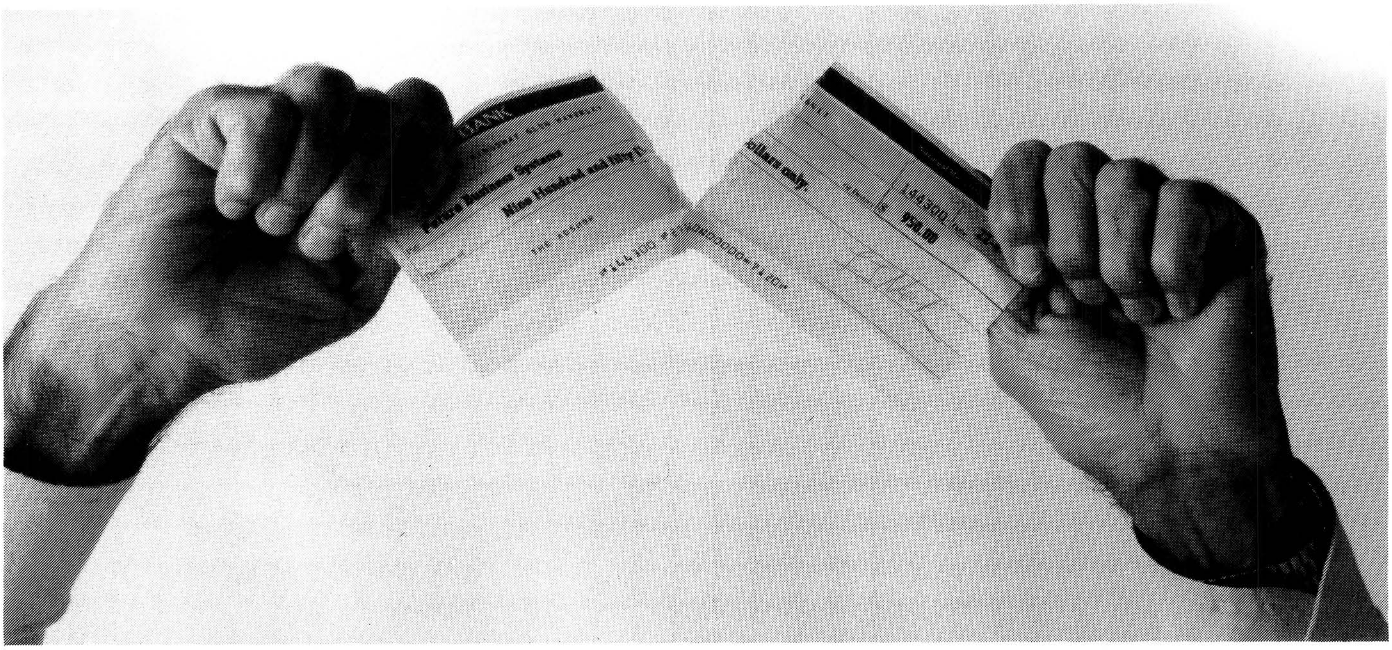
The complexities of a network solution make it often impractical to see the configuration you intend to use before you buy. Additionally, facilities available differ considerably, and it is therefore wise to take professional advice from an independent source unless you are fully familiar with the proposed solution.

If your requirements are basically simple — sharing accounts and general office procedures like word processing, for example — and you need only a limited number of users with basic facilities, then a multi-user micro provides a cost-effective and reliable solution.

You will, however, be unable to use more sophisticated software like Lotus or Microsoft Word, or any graphics or RAM-resident utilities like SideKick.

It should be possible to see hardware and software of an established multi-user system running together before you purchase, and your dealer can probably arrange for you to visit a reference site with requirements similar to your own.

END



If our accounting software doesn't save you a packet, don't pay for it!

There's plenty of accounting software packages to choose from.

But only one company has the guts to put their money where their mouth is: Future Business Systems.

To date we have supplied over 2,000 systems and we're so confident that our general accounting software can solve your invoicing, debtors, creditors, stock, general ledger, and sales analysis headaches that we'll send it to you for a free evaluation.

(The real McCoy too - not a limited 'demo' version).

You get a fair go. A chance to really put it through it's paces.

You get to use your own computer, in your own place, at your own pace.

(If you don't already have a PC, we can demonstrate one of those too.)

Either way, you can't lose.

So send the coupon now with a hundred bucks deposit, and we'll send you the disks and manual.

If you like it, (and we're sure you will) send us another $850 and the package's yours to keep.

If you don't like it; don't pay for it.

If you don't reckon it's going to save you a heap of time and money; send it back.

We'll send your hundred dollars back too so you haven't lost a thing.

(Except some exceptional accounting software of course).

So stop comparing brochures and contrived demonstrations.

Prove our promise. Send the coupon.

☐ YES, please send me your general accounting software package for a free 2 month evaluation.

Version: ☐ MS DOS Hard Disk System

☐ I enclose a cheque for $100 as deposit.

☐ Please deduct $100 from my credit card account as deposit.

☐ Visa ☐ Mastercard ☐ Bankcard

☐ Diners ☐ Amex

Number ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Expiry date ______________________

Name ______________________

Company name as you wish it to appear on invoices & reports throughout software

____

Address ______________________

____

____

Authorisation ______________________

I understand that I may return the package in good condition anytime within 2 months from when I receive the software and my deposit will be returned. After the trial evaluation I may keep the package by investing another $850.

☐ Please send me more information on your software.

Suite 6 105 Hawthorn Road
Caulfield North, 3161.
Ph: (03) 523 9211

future business systems

AdShop/fbs 206

Menus à la 1-2-3

You can provide your IBM PC applications programs with a Lotus-style interface by using the files MAKEBAR produces with next month's SLASHBAR utility.

This month we present part one of Robert Hummel's utility to add a Lotus-like control menu to your existing applications programs. Part two will appear next month.

Wouldn't it be nice if all your applications had been designed to use the same Lotus-style command interface? It would certainly simplify learning new programs, and it would go far toward eliminating the traditional conflict between the command-oriented and the menu-driven workers in your office.

You can't do much about the control structure of an existing program, of course. But what you *can* do is outfit that program with a pop-up 'shell' that executes the program commands in a way that looks and feels as familiar as the Slash-key-activated menu in 1-2-3. Hard-core users can then run the program without ever calling up the Lotus-like slashbar menu. But for those who want it, a standard, easy-to-use executable menu interface is only a key-stroke away.

SLASHBAR.COM, the program that superimposes the pop-up control menu over your applications program is presented in next month's issue. This month's article covers the design and construction of menus that are suitable for SLASHBAR.COM to use.

Since you will want to use the same standard interface program to implement the command sets of a variety of existing software applications, I've devised a uniform procedure for menu preparation. This involves not only organising menu choices in a logical way, but putting them in a simple block-structure format. The files you prepare are then compiled into the form required by SLASHBAR by running them through MAKEBAR.COM, a program which will be presented here. Each step of the procedure will be illustrated by constructing a working 1-2- 3-style shell for a number of DOS commands. That way you can see exactly how to implement the command set of your favourite software applications.

Downloading

The easiest way to get your own copy of MAKEBAR is to download it via modem from Microtex on Telecom's Viatel (page *6663#) or by sending a blank, formatted diskette with a stamped self-addressed packet to the attention of Jean, *APC,* 2nd Floor, 215 Clarence Street, Sydney 2000. You may, however, wish to type the listing in yourself. The assembly language listing is shown in Fig 1, and a Basic program that will create MAKEBAR .COM when you run it once is shown in Fig 2. The sample DOS menu file, DOS.BDF, is shown in Fig 3.

Once you have obtained MAKEBAR .COM, you use it to compile the menu file you prepare with the following syntax:

MAKEBAR [path]input_file [path]output_file

The input-file must be a Bar-menu Definition File similar to the sample DOS menu file (DOS.BDF) shown in Fig 3. (You do not have to use the specific extension .BDF, although following the discussion below will be easier if you do.) The output file will be a compiled version of the input and is usually given a .BAR extension. Both DOS.BDF and DOS.BAR are also available for downloading from Microtex and will be included on disks sent to *APC* as described above. If MAKEBAR encounters any problems in compiling a menu file, an error message and line number will be displayed.

Making a menu

To facilitate the explanation, I'll refer to the menus you prepare for each of your applications programs as Bar-menu Description Files, giving them the extension .BDF.

Preparing a BDF is not a difficult task, but it does take some planning to produce the best possible menu. It will help to bear in mind that SLASHBAR operates in some ways like a keyboard macro program. That is, when you select the first letter or a command from the menu, SLASHBAR substitutes an alternate key sequence, namely, the commands in your program. SLASHBAR goes further than a simple keyboard macro in that it allows you to

MAKEBAR at a glance

MAKEBAR.COM is a tokenising compiler designed for menu files that will be used with SLASHBAR.COM (presented in next month's issue of APC) to provide a Lotus-style interface for non-Lotus applications programs. The syntax for MAKEBAR is

MAKEBAR [path]input_file [path]output_file

where the input_file is a user-designed .BDF file containing the applications program commands in a format prescribed in the text of this article. The output_file is a .BAR menu file to be used by SLASHBAR.

impose a whole, multilevel 'front-end' interface over your current applications program, but the similarity remains. In preparing your menu levels, you may also want to bear in mind that, by designing similar shells for your other programs, you can have a consistent interface for very dissimilar applications.

Menu trees

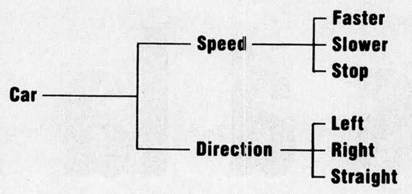
For most spreadsheet users, working with a menu tree is a familiar experience. But for many others, used to DOS's single command-line input, a little explanation may be helpful. A menu tree is a convenient way of grouping the command choices that control a program's operation. Consider the example of driving a car. At any given moment, you have a set of choices: you can increase or decrease your speed, stop, turn left or right, or go straight. The diagram 'A Menu Tree for Driving a Car' shows how a menu tree is used to represent those choices. A path is followed from left to right, with a choice required at each juncture. (A menu tree may also be drawn hierarchically, from the top to the bottom. The important thing to notice is that the tree generally gets wider as you travel further into it.) In a similar way, a menu tree can be created for an applications program by analysing how the application currently works, and what the choices are.

By way of example, let's construct a menu to implement some common DOS commands. The first step is to divide the commands into categories by function or application. In our car-driving menu, the commands were divided into those affecting speed and those affecting direction. For DOS, I'll choose a subset of the available commands and create categories that reflect the type of object on which they act. The table 'Commands and Categories for a Sample DOS Shell' lists the DOS commands and categories I've chosen for this example.

The category names will become the choices, or options, on the top menu level, analogous to SPEED and DIRECTION in the car menu. When naming your options, try to ensure that, at the same organisational level, each begins with a different letter. Using two option names that begin with the same letter will prevent the second command from being executed when only the first letter of the name is pressed.

An option may either cause an immediate action, as in the case of the CLS command, or it may be processed as if it were the top level of a separate menu. Suboptions are then grouped by category under each main option and names are chosen to represent the function of each group. The names of the options do not have to be the same as the command itself — I did this only for clarity in the current example. When a command leaves no further choices, that branch of the menu tree is ended. The 'DOS Menu Tree' diagram shows what the completed menu tree for the DOS shell example looks like.

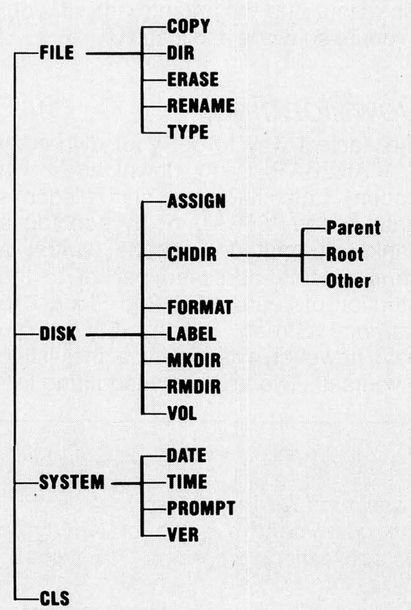
A menu tree for driving a car



Commands and categories for a sample DOS shell

COMMAND	CATEGORY
DIR	FILE
COPY	FILE
TIME	SYSTEM
ASSIGN	DISK
CHDIR	DISK
CLS	SCREEN
ERASE	FILE
FORMAT	DISK
LABEL	DISK
MKDIR	DISK
PROMPT	SYSTEM
RENAME	FILE
RMDIR	DISK
TYPE	FILE
VER	SYSTEM
VOL	DISK

A DOS menu tree



Planting the tree

Once the menu tree is designed, transforming it into a Bar-menu Definition File is a simple process. The 'BDF Block Structure' diagram illustrates the general block structure and the components that make up each block of the menu, and the illustrative DOS menu (Fig 3) should help you follow the syntax so that the menu will compile under MAKEBAR. While the BDF file may be as large as desired, the BAR file is limited by the size of the output buffer, or about 46,000 bytes. *(As a rough indicator, the DOS.BDF file is 3,072 bytes long. After being compiled by MAKEBAR.COM, the resulting DOS.BAR file is 1,403 bytes in length. — Ed).* As you build menus, keep in mind that the purpose of the menu is to enter the keystrokes needed by the application to perform the function you have picked with the menu. When the pop-up menu is activated, the generated keystrokes are stored in an internal string buffer until it is time to execute them. If the menu command is not completed, the buffer is emptied and no keys will be passed to the application.

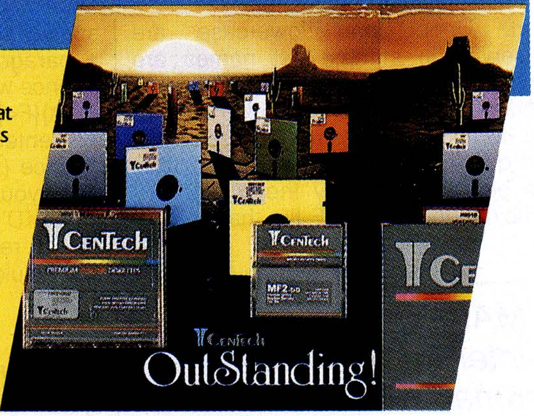
To help others understand your work (and to remind yourself weeks or more later!), you can include comments in the source (.BDF) file. The comment character, which must begin each comment, is the semicolon (;). Comments may occupy a separate line or follow a command. During compilation, when MAKEBAR encounters a semicolon, it ignores the remainder of the line. Because MAKEBAR uses a simple algorithm to read and translate the source file, a semicolon must be represented in names or quoted strings by the {c}1 key combination.

Two types of text entries are used in menu files. A 'string' is an entry surrounded by quotes ("). "DOS 3.1" and "JiffyCalc Spreadsheet" are examples of valid strings. A string may not contain the quote character, but the {C}3 combination may be used instead. A 'name' is an entry consisting of a single word and must contain no spaces. To aid readability, separation characters may be used in names: DO-THIS, DO_THAT, DOITNOW are all

WIN A LUXURY HAWAIIAN HOLIDAY FOR TWO!

Say hello Hawaii

WITH CENTECH &



Like to spend a luxurious holiday on the world's most exciting tropical island absolutely free?

Read on and you could enjoy a week for two in Hawaii valued at $3,500 compliments of Centech Colour Diskettes and APC's Buyer's Guides to Hardware and Software.

Centech colour diskettes are "The colourful solution to data organisation". TM

They come in fourteen different colours so you can immediately locate the diskettes you need.

For example, you can colour code accounts receivable in red, accounts payable in green, inventory in yellow and so on. Imagine the time you'll save.

Centech Colour Diskettes are made in the USA to the highest technical standards. Each diskette is tested and certified to be 100% error free to 75% clipping level and free of manufacturing defects. Or we'll replace it free of charge. Refer to Centech's "Timeless Warranty".

To win the Hawaiian holiday, simply complete the entry form in the 1987 Australian Personal Computer Hardware or Software Guides – available from newsagents everywhere. Or visit your local dealer and pick up an entry form.

All entries received at Centech or their dealers by 5pm Friday September 4 will be included in the grand draw.

EXTRA FREE OFFER!
BUY CENTECH DISKETTES NOW
AND GET FINANCIAL ABACUS FREE

Buy a pack of 5.25" DS/DD or DS/HD Centech colour diskettes by July 31 from any of the dealers listed here and we'll give you the valuable **Financial Abacus** software absolutely free.

Financial Abacus is one of the most useful software tools for business large or small. Or anyone who deals with money.

It runs on IBM PC, XT, AT* and 100% compatible with colour or monochrome monitor.

Financial Abacus computes investment yields, loan payments and amortisations, calculates present/future value rates of return etc, adds subtracts and multiplies and a whole lot more. It also features on-line help, pop-up windows, 10 key or reverse logic and uses extensive on-line tutorial.

Hurry for this special offer while stocks last!

*IBM PC, XT, AT are trademarks of IBM.

TO FIND YOUR NEAREST CENTECH DEALER, CALL ONE OF THESE NUMBERS:

__QLD__ Data Disks & Accessories, 97 Moggill Road, Taringa. Qld. 4068. Ph: (07) 870 3306

__N.S.W.__ Contact Computer Supplies, 27 Atchison Street, St. Leonards. NSW. 2065. Ph: (02) 439 8877

XL Computing Pty Ltd, 58 Roberts St, Rozelle. NSW. 2039. Ph: (02) 818 3586

__VIC__ Carrycom (Aust)-Victoria, 106 Vincent Street, Oak Park. VIC. 3046. Ph: (03) 300 3334

__S.A.__ Excel Computer Suppliers Pty. Ltd. 110 Rundle Street, Kent Town. S.A. 5067 Ph: (08) 363 0466

__TAS.__ Management Technology, Cnr. Elizabeth & Brisbane Streets, Hobart. Tas. 7000. Ph: (002) 34 4522

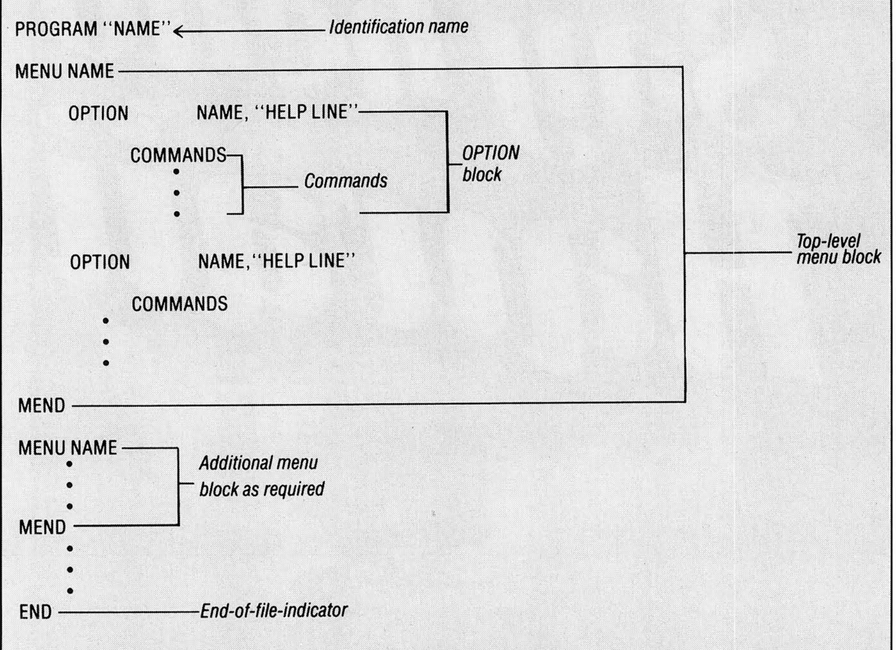
__W.A.__ P.T. Computer Professionals, 6/325 Harborne Street, Osborne Park. W.A. 6017. Ph: (09) 444 9011

__N.T.__ Kent Computer Plus, 42 Stuart Highway, Stuart Park. N.T. 5790. Ph: (089) 81 4755

__NTH N.S.W.__ Chamelle Pty. Ltd., P.O. Box 193, Byron Bay. NSW. 2481. Ph: (066) 87 8369

the UN 906

The BDL block structure



valid. Upper and lowercase are preserved in strings, but names are capitalised in the output file.

Strings may contain any character or key combination (except the comment and quote characters themselves) that can be recognised by the BIOS. Key combinations in a BDF file that are not recognised by the BIOS will produce an error message. This means that it may not be possible for you to include *all* commands for a given application into the menu structure. Redundant key combinations, such as {S}a instead of A, will also produce an error message.

Alphanumeric keys are entered by typing them. All special keys such as the function keys and Shift-key combinations are entered in symbolic form as text surrounded by braces. The Shift, Ctrl, and Alt keys affect only the immediately following key. See the table 'Special Key Names for Use with MAKEBAR' for a listing of the available special keys. For example, to block out a paragraph in Word Perfect, the sequence would be

"{A}{F4}{ENTER}"

To enter the WordStar Ctrl-KD sequence (to end editing and save changes), you would use the string

"{C}KD"

and to replace the current file in 1-2-3, you would use

"/FSR"

'MAKEBAR acts as an interface between the human menu writer and the SLASHBAR program, simplifying the tasks of both.'

Building the BDF

A BDF file always begins with the word PROGRAM, followed by a string. Since different menu files may be loaded into SLASHBAR at different times, the first ten characters of the string are encoded in the compiled .BAR file for display in the pop-up window. PROGRAM must be the first non-comment line in the BDF file, and it must appear only once. Conversely, END causes processing of the input file to cease and is the last command read. Each BDF must include an END.

The remainder of the file consists of MENU-MEND blocks. Each block corresponds to one complete set of command choices. In the DOS example in Fig 3, there are five menu blocks; the top-level block (which I'll call MAIN); three second-level blocks (the FILE, DISK, and SYSTEM submenus); and one third-level block (the CHDIR sub-submenu). Note that the CLS option does not require a menu block since that command terminates at the first level. The MENU block that follows the PROGRAM command is assumed to be the top-level menu and will be the first executed. Subsequent MENU blocks may appear in any order.

Each MENU statement takes a 'name' as its argument, and no two menus can have the same name. The name is used as a target when control is transferred between menus with the EXECUTE command. Attempting to use two identical menu names will cause MAKEBAR to report a Bad Menu Reference.

The MENU block is divided into one or more OPTION blocks. An OPTION block comprises three separate parts: name, help line, and commands. While, like a menu, each option must have a name, there are no restrictions as to uniqueness. The same option name may be used in different menus with different meanings without causing a problem for the compiler. (This would not, however, be the best design for a consistent interface). Because options may be selected by pressing their first letter, if two options begin with the same letter, the second option can never be executed by pressing that letter. (It can be invoked by positioning the cursor and pressing Enter). This property could be used to prevent accidental use of a command by making it more difficult to invoke.

The help string must follow each option name on the same line. This string will be displayed below the option names when that option is selected with the cursor. The length of this

Special key names for use with MAKEBAR

{ESC}	Escape
{TAB}	Tab
{ENTER}	Enter
{BS}	Backspace
{HOME}	Home
{PGUP}	Page Up
{PGDN}	Page Down
{END}	End
{U}	Up Arrow
{D}	Down Arrow
{L}	Left Arrow
{R}	Right Arrow
{INS}	Insert
{DEL}	Delete
{C}	Control
{S}	Shift
{A}	Alt

Function keys

{F1} {F2} {F3} {F4} {F5}
{F6} {F7} {F8} {F9} {F10}

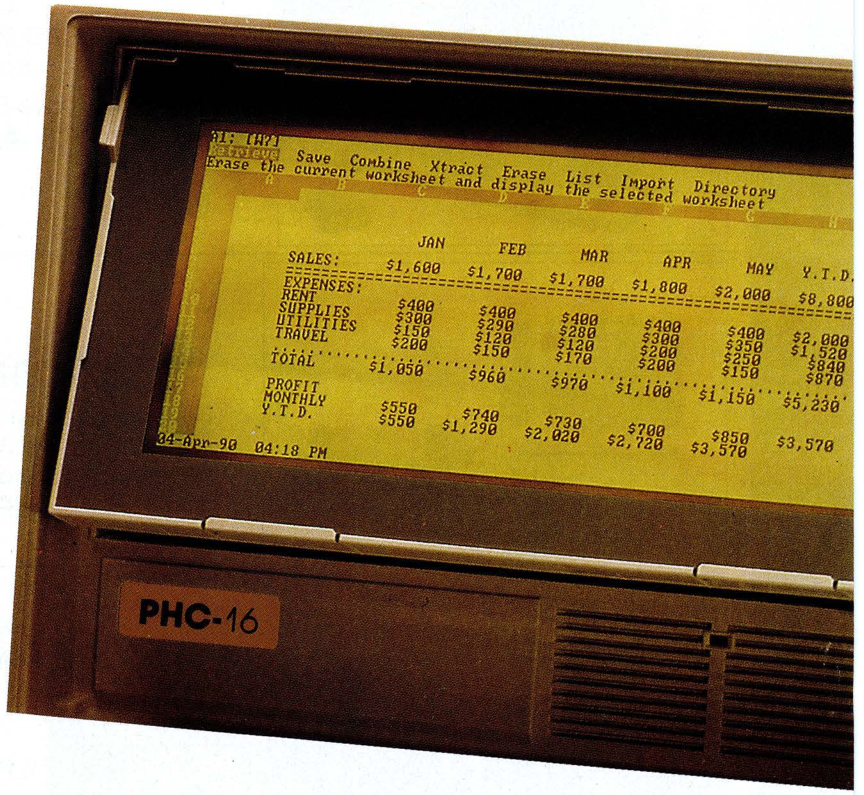
```
;=========================================================================
;  MAKEBAR: read a bar-definition-file (.BDF) and produce a tokenized
;  .BAR file to be read by the TSR interpreter.
;-------------------------------------------------------------------------
CSEG     SEGMENT PUBLIC  PARA     'CODE'
         ASSUME  CS:CSEG, DS:CSEG, ES:CSEG, SS:CSEG
                 ORG      100H
ENTPT:           JMP      MAIN

COPYRIGHT  DB  "MAKEBAR 1.0 (c) 1987, Ziff-Davis Publishing Corp",CR,LF,'$'
AUTHOR     DB  1AH,"Robert L. Hummel"

;=========================================================================
;  EQUATES
;-------------------------------------------------------------------------
SPACE              EQU      20H                         ;Some keys
CR                 EQU      0DH
LF                 EQU      0AH
QUOTE              EQU      22H
TAB                EQU      09H

INPUT_BUF_LEN      EQU      4000                        ;Size constants
OUTPUT_BUF_LEN     EQU      46000
MENU_BUF_LEN       EQU      4000
MENU_TBL_LEN       EQU      4000
BUF_TOTAL = INPUT_BUF_LEN + OUTPUT_BUF_LEN + MENU_BUF_LEN + MENU_TBL_LEN

_SHIFT             EQU      1                           ;Internal shift flags
_CTRL              EQU      2
_ALT               EQU      4


;-------------------------------------------------------------------------
;  BUFFERS AND POINTERS
;-------------------------------------------------------------------------
INPUT_HNDL         DW       0                           ;Handle of source file
INPUT_HNDL_PTR     DW       0                           ;Pointer to source file
INPUT_BUF_END      DW       0FFFFH                      ;Used by GET_CHAR
OUTPUT_HNDL        DW       0                           ;Handle of output file
MENU_HEAD          DW       0                           ;Pointer to current menu
SHIFT_FLAGS        DB       0                           ;Hold current shift state

;-------------------------------------------------------------------------
;  COUNTERS
;-------------------------------------------------------------------------
SOURCE_LINE        DW       0                           ;For error messages
NEW_REF            DB       -1                          ;Two counters track menu
OLD_REF            DB       0                           ; references

;-------------------------------------------------------------------------
;  TABLES
;-------------------------------------------------------------------------
CMD_TABLE          LABEL    BYTE                        ;All commands names
_ASK               EQU      0                           ; and their token values
A_CMD              DB       'ASK',0
_CR                EQU      1
C_CMD              DB       'CR',0
_EXECUTE           EQU      2
E_CMD              DB       'EXECUTE',0
_INPUT             EQU      3
I_CMD              DB       'INPUT',0
_MENU              EQU      4
M_CMD              DB       'MENU',0
_OPTION            EQU      5
O_CMD              DB       'OPTION',0
_PROGRAM           EQU      6
P_CMD              DB       'PROGRAM',0
_TYPE              EQU      7
_CMD               DB       'TYPE',0
_MEND              EQU      8
                   DB       'MEND',0
_END               EQU      9
                   DB       'END',0
_SEND              EQU      10
                   DB       0                           ;End-of-table byte
;-------------------------------------------------------------------------
KEY_NAME_TBL       LABEL    BYTE                        ;Special key names
                   DB       "S",0,"C",0,"A",0

                   DB       "F1",0,"F2",0,"F3",0,"F4",0,"F5",0
                   DB       "F6",0,"F7",0,"F8",0,"F9",0,"F10",0

                   DB       "ESC",0,"TAB",0,"ENTER",0,"BS",0

                   DB       "HOME",0,"PGUP",0,"END",0,"PGDN",0,"INS",0
                   DB       "DEL",0,"U",0,"D",0,"L",0,"R",0,0
;-------------------------------------------------------------------------
;  These keys may be combined with the CRTL and ALT keys
;-------------------------------------------------------------------------
KEY_TBL_1          DB       "ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890-=\[]",0

;-------------------------------------------------------------------------
;  CTRL combinations for 1234567890-= (use {c}1 for ; {c}3 for ")
;-------------------------------------------------------------------------
KEY_TBL_2          DW       003BH,0FE03H,0022H,0,0,001EH,0,0,0,0,001FH,0
                   DW       001CH, 001BH, 001DH
;-------------------------------------------------------------------------
;  Scan codes for alpha keys a-z (used for ALT-alpha)
;-------------------------------------------------------------------------
KEY_TBL_3          DB       01EH,30H,2EH,20H,12H,21H,22H,23H,17H,24H,25H,26H
                   DB       32H,31H,18H,19H,10H,13H,1FH,14H,16H,2FH,11H,2DH
                   DB       15H,2CH

;-------------------------------------------------------------------------
;  SHIFT,CTRL for enter,bs,home,pgup,end,pgdn,ins,del,up,down,left,right
;-------------------------------------------------------------------------
KEY_TBL_4          DB       0DH,0FEH, 8,7FH, 47H,77H, 49H,84H, 4FH,75H
                   DB       51H,76H, 52H,0, 53H,0, 48H,0, 50H,0, 4BH,73H,4DH,74H

*-------------------------------------------------------------------------

;  FLAGS

;-------------------------------------------------------------------------
MENU_FLAG          DB       0                   ;Non-zero when open menu blk
OPTION_FLAG        DB       0                   ;Non-zero when open option blk
PROGRAM_NAME_FLAG DB        0                   ;Non-zero when PROGRAM cmd read

;-------------------------------------------------------------------------
```

```
;  MESSAGES
;-------------------------------------------------------------------------
USAGE_MSG          DB       "Usage: MAKEBAR [path]input_file [path]output_file$"
BAD_FILE_MSG       DB       "Can't Open File$"
READ_MSG           DB       "Error Reading File$"

DUP_CMD_MSG        DB       "Duplicate Cmd$"
CMD_ORDER_MSG      DB       "Cmd Out Of Order$"
UNK_CMD_MSG        DB       "Unknown Cmd$"

NEST_MSG           DB       "MENU Without MEND$"
SYNTAX_MSG         DB       "Syntax Error$"
NO_NAME_MSG        DB       "Missing Name$"
REF_MSG            DB       "Bad MENU Reference$"
EOF_MSG            DB       "Missing END$"
DEAD_KEY_MSG       DB       "Dead-Key or Bad Key$"
LINE_MSG           DB       CR,LF,"Error At Line #        $"
LINE_NUM_BUF       EQU      $-2

;=========================================================================
;  MENU FILE TOKENIZER - MAIN PROCEDURE
;-------------------------------------------------------------------------
MAIN               PROC     NEAR

                   MOV      AH,9                        ;Display string fn
                   MOV      DX,OFFSET COPYRIGHT         ;Say who we are
                   INT      21H                         ; Thru DOS

                   CLD                                  ;Strings moves forward
;-------------------------------------------------------------------------
;  Check the file specs given on the command line.  Open the files and
;  save the file handles.
;-------------------------------------------------------------------------
                   CALL     OPEN_FILES

;-------------------------------------------------------------------------
;  Read in the Menu-Definition-File and tokenize.  Write the output to
;  the new .BAR file for use with the resident interpreter.
;-------------------------------------------------------------------------
                   CALL     TOKENIZE

;-------------------------------------------------------------------------
;  Close and update any open files.  Terminate gracefully.
;-------------------------------------------------------------------------
                   CALL     CLOSE_FILES
                   MOV      AX,4C00H                    ;Terminate process
                   INT      21H                         ; Thru DOS
MAIN               ENDP

;=========================================================================
;  OPEN_FILES - Open the file given on the command line and the working
;  files needed during operation of the tokenizer.
;-------------------------------------------------------------------------
OPEN_FILES         PROC     NEAR

                   MOV      SI,81H                      ;Command line parameters
                   CALL     OPEN_A_FILE                 ;Open source
                   MOV      INPUT_HNDL,AX               ;Save handle

                   CALL     OPEN_A_FILE                 ;Open destination file
                   MOV      OUTPUT_HNDL,AX              ;Save handle

                   MOV      INPUT_BUF_END,0             ;Make refresh occur
                   RET

OPEN_FILES         ENDP

;=========================================================================
; OPEN_A_FILE - Read a string from the command line and attempt to open
;  it as a file.
;-------------------------------------------------------------------------
OPEN_CNT           DB       0                           ;Switch for open function

OPEN_A_FILE        PROC     NEAR

                   CALL     NON_WHITE                   ;Point SI to 1st nonwhite
                   CMP      AL,CR                       ;If not carriage return
                   JNE      HAVE_ARGS                   ; go parse arguments
NO_SPECS:
                   MOV      DX,OFFSET USAGE_MSG         ;Say how we are used
OPEN_ERR:
                   JMP      ERROR_EXIT                  ;Exit thru error procedure
HAVE_ARGS:
                   PUSH     SI                          ;Save start of string
                   CALL     WHITE                       ;Point past end
                   MOV      CX,SI                       ;End of string
                   POP      SI                          ;Restore start
                   SUB      CX,SI                       ;Get length of string
                   OR       CX,CX                       ;If zero
                   JZ       NO_SPECS                    ; no file names
                   MOV      DI,OFFSET PATH_BUF          ;Copy string here
                   REP      MOVSB                       ; do it
                   XOR      AL,AL                       ;Make ASCIIZ
                   STOSB                                ; put in buffer

;-------------------------------------------------------------------------
;  Attempt to open the file.
;-------------------------------------------------------------------------

                   MOV      AX,3D00H                    ;Open file for reading
                   CMP      OPEN_CNT,0                  ; if first file
                   JE       FILE_OPEN
                   DEC      AH                          ;Create file if second

FILE_OPEN:
                   MOV      DX,OFFSET PATH_BUF          ;Pathname of file
                   INT      21H                         ;Handle in AX
                   JNC      SOURCE_OPEN                 ;No carry if open OK
                   MOV      DX,OFFSET BAD_FILE_MSG
                   JMP      OPEN_ERR
SOURCE_OPEN:
                   INC      OPEN_CNT                    ;Change switch
                   RET

OPEN_A_FILE        ENDP

;=========================================================================
;  Close the files to update the length.
;-------------------------------------------------------------------------
CLOSE_FILES        PROC     NEAR
```

Fig 1 The assembly language source code for MAKEBAR.COM

CUT THE CORD

WITH THE SOTEC™ PORTABLE



The PHC-16 portable computer from Kohjinsha Sotec —Japan's leading electronics manufacturer — has cut the cord of dependence with Australia's first truly portable computer.

Utilising the latest advances in electronics the PHC-16 was designed by Quadram Corporation. It is portable, powerful and versatile, sacrificing nothing in its flexibility.

With a 20 Mb hard disk and available as a 5 ¼″ or 3 ½″ configuration, the car adaptor allows the PHC-16 to be used in the car, while the battery pack gives the businessman the flexibility to use the PHC-16 in a plane, train or boat.

Dynamic state-of-the-art technology introduces the infra-red cordless keyboard and new plasma effect screen, which can be read from any angle.

Able to read and write the formats of IBM PC/XT, IBM convertible, Zenith, Toshiba and NEC the Kohjinsha Sotec corporation has priced the PHC-16 at an affordable and competitive level.

The PHC-16 will be featured at the PC show at the Exhibition Building at Stand 327 Eastern Annex, from May 31 - June 3, where the supplier will provide a few more special surprises.

- Dealer enquiries welcome

OTHER FEATURES

- World time clock
- Communications software
- Hi speed RAM disk
- Battery status
- Built-in modem 300-1200 baud

Contact the Sole authorised Australian distributor:

KOHJINSHA SOTEC AUST. PTY. LTD.

17 Brighton Road
St. Kilda 3182
Tel: 534 0286
Fax: 534 4691

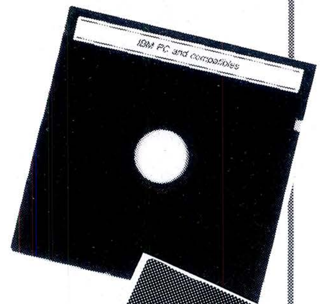
Warning: Sotec PHC-16 is a trademark of Kohjinsha Sotec Aust. Pty. Ltd.

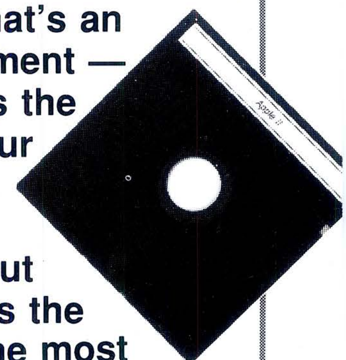
Koh 179

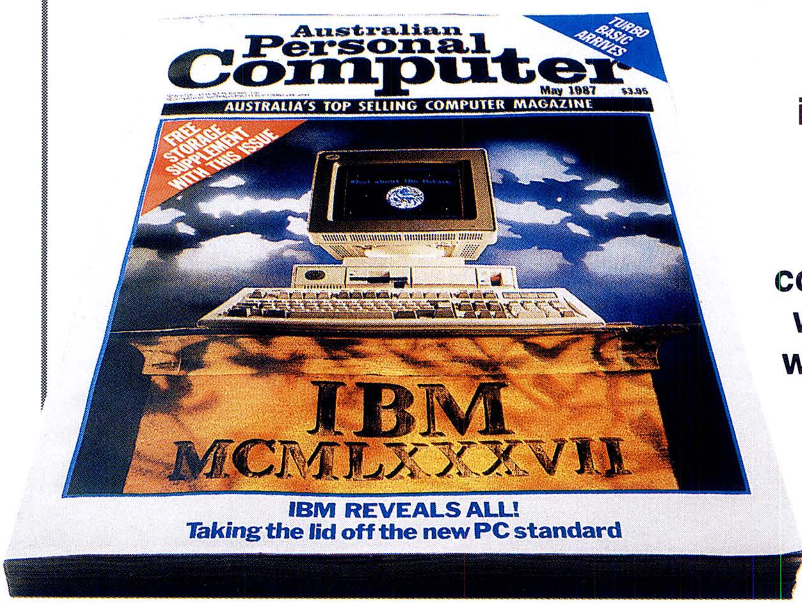
```
                MOV     AH,3EH                  ;Close file function
                MOV     BX,INPUT_HNDL           ; first file
                INT     21H                     ; Thru DOS

                MOV     AH,3EH                  ;Close file function
                MOV     BX,OUTPUT_HNDL          ; second file
                INT     21H                     ; Thru DOS
                RET

CLOSE_FILES     ENDP

;========================================================================
; TOKENIZE - Read and process the Bar Definition File (BDF).
;------------------------------------------------------------------------
TOKENIZE        PROC    NEAR

;------------------------------------------------------------------------
;  Clear flags and reset source line counter.
;------------------------------------------------------------------------
                XOR     AX,AX                   ;Zero
                MOV     PROGRAM_NAME_FLAG,AL    ;No program name
                MOV     MENU_FLAG,AL            ;Not inside MENU block
                MOV     SOURCE_LINE,AX          ;Source line counter

                MOV     DI,OFFSET MENU_NAME_TBL ;Fill the table with zeros
                MOV     CX,MENU_TBL_LEN         ;Entire length
                REP     STOSB                   ; do it

                CALL    REFRESH_BUFFER          ;Load some chars into buf
                MOV     DI,OFFSET OUTPUT_BUF    ;Init output buffer pointer

;------------------------------------------------------------------------
;  Parse the input file to find commands and arguments.
;------------------------------------------------------------------------
FIND_WORD:
                CALL    NON_WHITE               ;Find non-white char
                CMP     AL,CR                   ;Ignore blank lines
                JNE     TKN_1

                CALL    NEXT_LINE               ;Skip to next line
                JMP     FIND_WORD               ;Continue search
TKN_1:
;------------------------------------------------------------------------
;  SI points to word.  Compare with known commands.  Return token in AL
;  or 0FFh if not recognized.
;------------------------------------------------------------------------
                CALL    MAKEZ                   ;Copy word at SI to buffer
                                                ; and make ASCIIZ
                PUSH    SI                      ;Preserve SI
                MOV     SI,OFFSET CMD_TABLE     ;Look up word in this table
                CALL    TABLE_LOOKUP            ;Compare cmd in buffer
                POP     SI                      ;AL = CMD # or FFh
                CMP     AL,0FFH                 ;Is error?
                JNE     TKN_1A                  ;No, valid CMD found
                MOV     DX,OFFSET UNK_CMD_MSG
                JMP     SHORT TKN_ERR
TKN_1A:
;------------------------------------------------------------------------
;  If this is a PROGRAM statement, load the name of the program into the
;  buffer.  Must be the first command in the file.
;------------------------------------------------------------------------
                CMP     PROGRAM_NAME_FLAG,0     ;Test if already had PROGRAM
                PUSHF                           ;Save result

                CMP     AL,_PROGRAM             ;Is this PROGRAM?
                JE      TKN_2                   ; yes, jump

                POPF                            ;Did we have one?
                JNZ     TKN_4                   ; yes, try next cmd
                JMP     TKN_7A                  ; no, error
TKN_2:
                POPF                            ; yes, Did we have one?
                JZ      TKN_3                   ;  No, this is first
                MOV     DX,OFFSET DUP_CMD_MSG   ;  Yes, indicate error
                JMP     SHORT TKN_ERR
TKN_3:
;------------------------------------------------------------------------
;  Copy the name of the program to the output buffer.
;------------------------------------------------------------------------
                MOV     BX,DI                   ;Point BX to start of buf
                MOV     AL,SPACE                ;Fill name with spaces
                MOV     CX,10                   ;10 chars
                REP     STOSB                   ;do it

                CALL    NEXT_WORD
                CALL    TKN_STRING              ;Copy quoted string

                INC     PROGRAM_NAME_FLAG       ;Make flag non-zero
                JMP     FIND_WORD               ;Get next command

TKN_4:
;------------------------------------------------------------------------
;  END command terminates processing.
;------------------------------------------------------------------------
                CMP     AL,_END                 ;If not END, jump

                JNE     TKN_4A

                MOV     AL,MENU_FLAG            ;If no open menus
                OR      AL,OPTION_FLAG          ; or options
                JZ      NO_OPENS                ; then clean up
TKN_4AA:
                MOV     DX,OFFSET NEST_MSG      ;Else, nesting error
                JMP     SHORT TKN_ERR
NO_OPENS:
                MOV     AL,NEW_REF              ;If no unbalanced menu
                OR      AL,OLD_REF              ; references
                JZ      REFS_OK                 ; write the results
                MOV     DX,OFFSET REF_MSG       ;Else, error
TKN_ERR:
                JMP     ERROR_EXIT
REFS_OK:
;------------------------------------------------------------------------
;  Flush the output buffer.
;------------------------------------------------------------------------
                MOV     DX,OFFSET OUTPUT_BUF    ;Source buffer
                MOV     CX,DI                   ;End of buf
                SUB     CX,DX                   ; minus start = length
                MOV     AH,40H                  ;Write to file
                MOV     BX,OUTPUT_HNDL          ; this handle
                INT     21H                     ;Thru DOS
                RET                             ;Return to top level

;------------------------------------------------------------------------
;  Is this a command to start a MENU block?
;------------------------------------------------------------------------
TKN_4A:
                CMP     AL,_MENU
                JNE     TKN_6                   ;Jump if not MENU

;------------------------------------------------------------------------
;  If we are already inside an active menu block, either an MEND is
;  missing or the menus are nested (both are errors).
;------------------------------------------------------------------------
                CMP     MENU_FLAG,0
                JNE     TKN_4AA                 ;Jump if in block

;------------------------------------------------------------------------
;  Execute MENU block startup code.  Point BX to a buffer where the
;  tokenized output will be temporarily stored.  When then menu block is
;  closed, the addresses in the menu header will be adjusted by the length
;  of the header.
;------------------------------------------------------------------------
TKN_5:
                MOV     BX,OFFSET MENU_BUF      ;Buffer for menu tokens
                MOV     MENU_HEAD,DI            ;Location of menu header
                XOR     AX,AX                   ;Number of OPTIONS = 0
                STOSW                           ; placed in header (at DI)
                INC     MENU_FLAG               ;Say we're inside menu

;------------------------------------------------------------------------
;  Make sure the MENU command is followed by a name
;------------------------------------------------------------------------
                CALL    NEXT_WORD               ;Point SI to next word
                CMP     AL,CR                   ;If CR, no name = error
                JE      TKN_8A

;------------------------------------------------------------------------
;  If Menu name is in table, it was referenced by an earlier menu and
;  the address must be put back into that command line.  If it's not in
;  the table, add it and point to it's address.
;------------------------------------------------------------------------
                CALL    MAKEZ                   ;Change menu name to ASCIIZ
                MOV     AX,MENU_HEAD            ;Signal says posting
                SUB     AX,OFFSET OUTPUT_BUF    ;Make into offset
                CALL    SEARCH_MENU_TABLE       ;Enter in table or resolve
                                                ; reference or error
                CALL    NEXT_LINE               ;Skip to next line
                JMP     FIND_WORD               ;Continue parsing

;------------------------------------------------------------------------
;  If not a MENU command, must be inside a block to be valid.
;------------------------------------------------------------------------
TKN_6:
                CMP     MENU_FLAG,0
                JE      TKN_7A                  ;Jump if outside block
TKN_7:
;------------------------------------------------------------------------
;  Inside a MENU block must reside a series of OPTION blocks.
;------------------------------------------------------------------------
                CMP     OPTION_FLAG,0           ;Test if in option block
                PUSHF                           ; save result

                CMP     AL,_OPTION
                JE      TKN_8                   ;Jump if OPTION
                POPF                            ;Inside option block?
                JNE     TKN_12                  ;Jump if yes
TKN_7A:
                MOV     DX,OFFSET CMD_ORDER_MSG
                JMP     TKN_ERR
TKN_8:
                POPF                            ;Inside option block?
                JE      NEW_OPTION_BLOCK        ;Jump if not

;------------------------------------------------------------------------
;  Close this option block by adding the SEND command.
;------------------------------------------------------------------------
                MOV     AL,_SEND                ;Send token
                CALL    PUT_MENUBUF             ; to buffer

;------------------------------------------------------------------------
;  To start new option block, increase the option counter.
;  Parse name and help line and point the pointers at them.
;------------------------------------------------------------------------
NEW_OPTION_BLOCK:
                INC     OPTION_FLAG             ;Inside option block
                MOV     BP,MENU_HEAD            ;Number options this MENU

                INC     WORD PTR [BP]           ; increase by 1

;------------------------------------------------------------------------
;  Save the option name
;------------------------------------------------------------------------
                CALL    NEXT_WORD               ;Point to OPTION NAME
                CMP     AL,CR                   ;Option must have name
                JNE     TKN_9                   ;Jump if name
TKN_8A:
                MOV     DX,OFFSET NO_NAME_MSG
                JMP     TKN_ERR
TKN_9:
                CALL    MAKEZ                   ;Make name at SI into ASCIIZ
                MOV     AX,BX                   ;Address where name is stored
                SUB     AX,OFFSET MENU_BUF      ; from start of buffer
                STOSW                           ; is saved in menu header

;------------------------------------------------------------------------
;  Copy the option name from the asciiz buffer to the menu buffer
;------------------------------------------------------------------------
                PUSH    SI                      ;Save register
                MOV     SI,OFFSET PATH_BUF      ;Source for copy
COPY_NAME:
                LODSB                           ;Get char
                CALL    PUT_MENUBUF
                OR      AL,AL                   ;If not last byte
                JNZ     COPY_NAME               ;continue copy
                POP     SI                      ;Restore register
                CALL    NEXT_WORD               ;Look for help line

;------------------------------------------------------------------------
;  HELP line is quoted string
;------------------------------------------------------------------------
TKN_11:
                MOV     AX,BX                   ;Offset from start of buf
                SUB     AX,OFFSET MENU_BUF      ; is location to put
                STOSW                           ; in header
                CALL    TKN_STRING

;------------------------------------------------------------------------
;  Put the offset where the tokenized commands will start into the header.
;------------------------------------------------------------------------
                MOV     AX,BX                   ;Current location
                SUB     AX,OFFSET MENU_BUF      ; minus start is offset
                STOSW                           ;Put word
                JMP     FIND_WORD

;------------------------------------------------------------------------
;  The MEND command requires some cleanup to be performed.
;  The length of the header is calculated and added to the offsets in
;  the header.  Then the menu_buf is appended to the output_buf.
;------------------------------------------------------------------------
```

Australia's No.1 Magazine!

Last month APC did it!







It became the biggest magazine of any sort in the country. That's an important achievement — because it reflects the support from our readers and, of course advertisers, who always sniff out which magazine has the most — and the most influential — readers. Being the biggest is something APC will often be. Being the best is something it will always be.

To celebrate being top of the heap, we're making 5000 subscriptions available at the one-time low price of $29.75. That's 37% off the newsstand price! And that's not all: if you own a Mac, an IBM PC-compatible or an Apple II, we'll throw in a diskette containing dozens of ultra-powerful utilities to help you get the most out of your system. If you don't want the disk, take another $2.00 off the subscription price... pay only $27.75.

It's first come, first served . . . so get in first.

Call Roula now on 02-264 1266 to reserve your place. If you're in the first 5000 readers to call she'll give you a code to include on your card which will guarantee you don't miss out.

CALL NOW

TO RESERVE YOUR DISCOUNT SUBCRIPTION

Save up to 42% on your Subscription to APC

Subscribe now and receive APC's IBM PC and compatibles Utilities Disk — dozens of tested, ultra-powerful utilities

Yes! Rush me my **IBM PC-compatible** program and utilities diskette and begin my subscription to *APC* for:

☐ Please don't send me a disk. I have deducted $2 from my remittance

☐ 1 year (12 issues) for $29.75. A 37% saving ☐ 2 years (24 issues) for $55. A 42% saving

☐ This is a new subscription ☐ This is a renewal

Mr/Mrs/Ms ....

Address ....

Suburb.......... Postcode..........

Bill me later .... Signature..........

I enclose a cheque, made payable to Australian Personal Computer for $ ....

Please debit my American Express/Mastercard/Diners Club/Bank Card/Visa (delete where not applicable)

Account No. .... Signed ....

Expiry Date..........

No stamp required on this subscription form. Savings based on single issue price of $3.95

Save up to 42% on your Subscription to APC

Subscribe now and receive APC's IBM PC and compatibles Utilities Disk — dozens of tested, ultra-powerful utilities

Yes! Rush me my **Macintosh** program and utilities diskette and begin my subscription to *APC* for:

☐ Please don't send me a disk. I have deducted $2 from my remittance

☐ 1 year (12 issues) for $29.75. A 37% saving ☐ 2 year (24 issues) for $55. A 42% saving

☐ This is a new subscription ☐ This is a renewal

Mr/Mrs/Ms ....

Address ....

Suburb.......... Postcode..........

Bill me later .... Signature..........

I enclose a cheque, made payable to Australian Personal Computer for $ ....

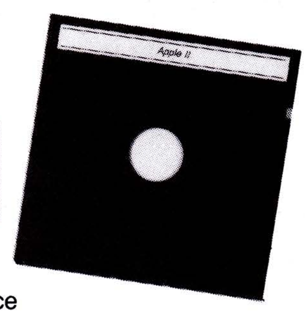
Please debit my American Express/Mastercard/Dinners Club/Bank Card/Visa (delete where not applicable)

Account No. .... Signed ....

Expiry Date..........

No stamp required on this subscription form. Savings based on single issue price of $3.95

Save up to 42% on your Subscription to APC



Subscribe now and receive APC's IBM PC and compatibles Utilities Disk — dozens of tested, ultra-powerful utilities

Yes! Rush me my **Apple II** program and utilities diskette and begin my subscription to *APC* for:

☐ Please don't send me a disk. I have deducted $2 from my remittance

☐ 1 year (12 issues) for $29.75. A 37% saving ☐ 2 year (24 issues) for $55. A 42% saving

☐ This is a new subscription ☐ This is a renewal

Mr/Mrs/Ms ....

Address ....

Suburb.......... Postcode..........

Bill me later .... Signature..........

I enclose a cheque, made payable to Australian Personal Computer for $ ....

Please debit my American Express/Mastercard/Dinners Club/Bank Card/Visa (delete where not applicable)

Account No. .... Signed ....

Expiry Date..........

No stamp required on this subscription form. Savings based on single issue price of $3.95

No postage stamp required
if posted in Australia

BUSINESS REPLY POST
PERMIT No. 7 — ELWOOD
Postage and fee will be paid on delivery to

Australian Personal Computer
47 Glenhuntly Road,
Elwood, Vic. 3184

No postage stamp required
if posted in Australia

BUSINESS REPLY POST
PERMIT No. 7 — ELWOOD
Postage and fee will be paid on delivery to

Australian Personal Computer
47 Glenhuntly Road,
Elwood, Vic. 3184

No postage stamp required
if posted in Australia

BUSINESS REPLY POST
PERMIT No. 7 — ELWOOD
Postage and fee will be paid on delivery to

Australian Personal Computer
47 Glenhuntly Road,
Elwood, Vic. 3184

```
TKN_12:
                CMP     AL,_MEND
                JNE     TKN_12AA                ;If not MEND, move on

;----------------------------------------------------------------------
;  Close out the option block (if there was one).
;----------------------------------------------------------------------
                MOV     AL,_SEND                ;Write send token
                CALL    PUT_MENUBUF

;----------------------------------------------------------------------
;  Flush the buffers.
;----------------------------------------------------------------------
                PUSH    SI                      ;Save register
                MOV     SI,MENU_HEAD            ;Address of start of menu
                                                ; in the output file
                LODSW                           ;Number of entries in menu

                MOV     CX,AX                   ;#Words = # entries * 3
                SHL     CX,1                    ; *2
                ADD     CX,AX                   ; +1 is same as *3

                JCXZ    APPEND_TOKENS           ;NULL menu bailout
                PUSH    CX                      ;Save number words to update
                MOV     AX,CX                   ;Length of offset
                INC     AX                      ; plus one
                SHL     AX,1                    ; times two

                MOV     CX,MENU_HEAD            ;Offset of start of menu
                SUB     CX,OFFSET OUTPUT_BUF    ; from start of buf
                ADD     AX,CX                   ; plus length of header
                POP     CX
UPDATE_POINTERS:
                ADD     WORD PTR [SI],AX        ; makes pointers correct
                INC     SI                      ;Skip to next pointer
                INC     SI
                LOOP    UPDATE_POINTERS

;----------------------------------------------------------------------
;  Append the tokenized menu.
;----------------------------------------------------------------------
APPEND_TOKENS:  MOV     CX,BX                   ;End of menu buf
                MOV     SI,OFFSET MENU_BUF      ;start of menu buf
                SUB     CX,SI                   ;# bytes to transfer
                REP     MOVSB                   ;do it
                POP     SI                      ;restore register

;----------------------------------------------------------------------
;  Reset the flags.
;----------------------------------------------------------------------
                MOV     MENU_FLAG,0
                MOV     OPTION_FLAG,0
                JMP     FIND_WORD               ;get next command

;----------------------------------------------------------------------
;  Deal with commands other than PROGRAM, MENU, and OPTION
;----------------------------------------------------------------------
TKN_12AA:
                CALL    PUT_MENUBUF             ;Put the token in the file

                CMP     AL,_EXECUTE             ;If not execute
                JNE     TKN_13                  ; move on

;----------------------------------------------------------------------
;  EXECUTE command references another menu.  Let the SEARCH_MENU_TABLE
;  routine satisfy the reference, or leave a "wanted" message.
;----------------------------------------------------------------------
                CALL    NEXT_WORD               ;Point to named menu
                CMP     AL,CR                   ;End of line?
                JNE     TKN_12A
                JMP     TKN_8A                  ;(out of range jump)
TKN_12A:
                CALL    MAKEZ                   ;Put name in buffer
                MOV     AX,0FFFFH               ;= want address
                CALL    SEARCH_MENU_TABLE       ;Try and resolve
                JMP     FIND_WORD

;----------------------------------------------------------------------
;  Separate out commands that take arguments.
;----------------------------------------------------------------------
TKN_13:
                CMP     AL,_ASK                 ;Ask takes string
                JE      TKN_17
                CMP     AL,_TYPE                ;So does type
                JE      TKN_17
                JMP     FIND_WORD               ;Token already in, so go

;----------------------------------------------------------------------
;  These commads require the quoted string following them to be included
;  as an ASCIIZ string following the command byte.
;----------------------------------------------------------------------
TKN_17:
                CALL    NEXT_WORD               ;Point to string
                CALL    TKN_STRING              ;Copy it
                JMP     FIND_WORD

TOKENIZE        ENDP

;======================================================================
;  AX points to an ASCIIZ string.  Look up that string in table pointed
;  to by SI to see if we can find a match.
;----------------------------------------------------------------------
TABLE_LOOKUP    PROC    NEAR

                PUSH    DI                      ;Save registers
                PUSH    CX
                PUSH    DX

                XOR     CL,CL                   ;Command counter
CL_0:
                CMP     BYTE PTR [SI],0         ;End of table?
                JNZ     CL_2                    ; jump if not
                MOV     CL,0FFH                 ;Signal error
CL_1:
                MOV     AL,CL                   ;Return cmd number

                POP     DX                      ;Restore registers
                POP     CX
                POP     DI
                RET
CL_2:
                MOV     DI,AX                   ;Pointer to unknown command
                CALL    STR_CMP                 ;NC if matched
                JNC     CL_1
                INC     CL                      ;Point to next
                JMP     CL_0                    ;Test for table end

TABLE_LOOKUP    ENDP
```

```
;======================================================================
;  Compare strings at DI,SI where SI is a table.
;----------------------------------------------------------------------
STR_CMP         PROC    NEAR
STR_1:
                MOV     DL,[DI]                 ;Get char from string
                INC     DI                      ;Point to next
                MOV     DH,[SI]                 ;Get char from table
                INC     SI                      ;Point to next
                CMP     DH,DL                   ;If equal
                JE      STR_3                   ; jump
                DEC     SI                      ;Backup in table
STR_2:
                MOV     DH,[SI]                 ;Examine char in table
                INC     SI                      ;Goto next char
                OR      DH,DH                   ;Is it end of entry?
                JNZ     STR_2                   ; no, continue scanning
                STC                             ; return with failure
                RET
STR_3:
                OR      DX,DX                   ;If both not 0
                JNZ     STR_1                   ; continue compare
                CLC                             ; else, they match
                RET

STR_CMP         ENDP

;======================================================================
;  This procedure prints an error message and indicates the source line
;  number on which it occured.
;----------------------------------------------------------------------
ERROR_EXIT      PROC    NEAR

                MOV     AH,9                    ;Print the error message
                INT     21H                     ; Thru DOS

                MOV     DI,OFFSET LINE_NUM_BUF  ;Put line number here
                MOV     AX,SOURCE_LINE          ;Contains line number
                MOV     BX,10                   ;Base 10 numbers
LINE_LOOP:
                XOR     DX,DX                   ;Divide DX:AX by BX
                DIV     BX

                ADD     DL,30H                  ;Make number into ASCII
                MOV     [DI],DL                 ;Save it
                DEC     DI                      ;Move toward more significant
                OR      AX,AX                   ;If remainder not 0
                JNZ     LINE_LOOP               ; continue

                MOV     DX,OFFSET LINE_MSG      ;Write message
                MOV     AH,9                    ;Display string fn
                INT     21H                     ; Thru DOS

                CALL    CLOSE_FILES             ;Close files and terminate
                MOV     AX,4CFFH                ; with error=255
                INT     21H                     ; Thru DOS

ERROR_EXIT      ENDP

;======================================================================
;  Position SI to the begining of the next word.
;----------------------------------------------------------------------
NEXT_WORD       PROC    NEAR

                CALL    IS_WHITE                ;Is current char white?
                JNC     NW_1                    ; yes, jump
                CALL    WHITE                   ; no, find first white
NW_1:
                CALL    NON_WHITE               ;Scan for first non-white
                RET

NEXT_WORD       ENDP

;======================================================================
;  Enter with SI pointing to string.  Position so SI points at first
;  delimiter character AFTER the present char.  Return char in AL.
;  AL changed, SI moved by file routines.
;----------------------------------------------------------------------
WHITE           PROC    NEAR

                MOV     AL,[SI]                 ;Check current char
                CMP     AL,CR                   ; for EOL
                JE      W_RET                   ; and leave
W_LOOP:
                CALL    GET_CHAR                ;Get the next char
                CMP     AL,CR                   ;If EOL
                JE      W_RET                   ; return
                CALL    IS_WHITE                ;Returns NC if white
                JC      W_LOOP
W_RET:
                RET
WHITE           ENDP

;======================================================================
;  Enter with SI pointing to string.  Position so SI points at first
;  non-delimiter character AFTER the present char.  Return char in AL.
;  AL changed, SI moved by file routines.
;----------------------------------------------------------------------
NON_WHITE       PROC    NEAR

                MOV     AL,[SI]                 ;Check current char
                CMP     AL,CR                   ; for EOL
                JE      NW_RET                  ; and leave
NW_LOOP:
                CALL    GET_CHAR                ;Get the next char
                CMP     AL,CR                   ;If EOL
                JE      NW_RET                  ; return
                CALL    IS_WHITE                ;Returns NC if white
                JNC     NW_LOOP
NW_RET:
                RET
NON_WHITE       ENDP

;======================================================================
;  Examine Char at SI and return CY if non-white, NC if delimiter
;  Only flags changed.
;----------------------------------------------------------------------
DELIMS          DB      " ,:",LF,TAB            ;White chars

IS_WHITE        PROC    NEAR

                PUSH    AX                      ;Save registers
                PUSH    CX
                PUSH    DI

                MOV     AL,[SI]                 ;Examine current char
                MOV     CX,5                    ;Number delims to compare
                MOV     DI,OFFSET DELIMS        ;Here they are
                REPNE   SCASB                   ;Compare them
                CLC                             ;NC if delimiter
```

QUALITY
★ IBM-COMPATIBLES ★

- ☆ *We don't sell cheap computers*
- ☆ *We only sell FULLY-TESTED and minimum 20 DAY BURNT-IN SYSTEMS*
- ☆ *Real FULL 12 months Warranty*
- ☆ *Our MAIN-BUSINESS is HARDWARE-REPAIR, so we know what we are talking about!*

COMPUTER
★ REPAIR ★

- ☆ *We are specialized in IBM and CLONES*
- ☆ *We also care for Apple and CLONES*
- ☆ *We look at your problem very long and hard (we never give-up)*
- ☆ *Quick turn around, LOW RATES*
- ☆ *Easy parking, open 6 days (9.30 am-7 pm)*

HANTRON DATA SYSTEMS (HDS)
Unit 4, 191 Victoria Road,
Gladesville 2111.
Tel: (02) 816-3879

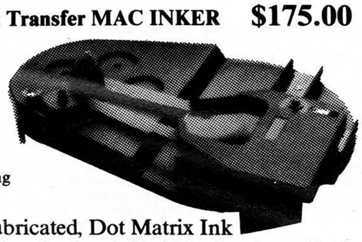
MAC INKER™

Re-ink any Fabric Ribbon
automatically for less than cents.

MAC INKER IM (Imagewriter ½) $135.00

Universal Cartridge or Spool MAC INKER (specify) **$175.00**

Heat Transfer MAC INKER $175.00

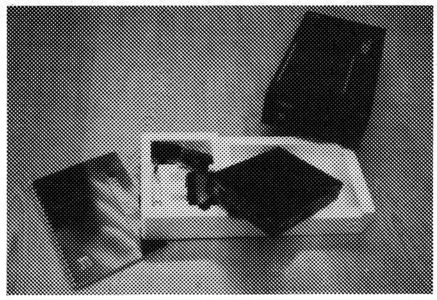


Shipping
$7.00

■ Lubricated, Dot Matrix Ink extends print-head life $5.90, bottle available in black, brown, red, green yellow, blue, purple, orange, gold and silver.
■ > 70,000 sold since 1982

All Mac Inkers are assembled in Australia and ready for use.
Call us on (07) 286 5590 for more information and a list of dealers.

Aussoft
Office 5, Dean Building
Queen Street
PO Box 476, Cleveland 4163



BIT BLITZER

LESS THAN 1/2 THE PRICE OF COMPETITIVE MODEMS

with these features:
CITT V22 (1200 BPS) & V21 (300 BPS)
BELL 212A (1200 BPS) & 103 (300 BPS)
Auto dial
Tone or pulse dialing
Auto answer
Auto redial
Full Hayes AT command set including all 17"S" registers
Call progress monitoring
Loop back for remote diagnostic
Carrier detect disconnect time adjustable
Internal speaker with volume manually and software controllable
8 LEDS (LIGHTS) indicate status and activity
Low power consumption 1.5 watts.

TELECOM APPROVED

ONLY $349

MBE
MIKE BOORNE ELECTRONICS PTY. LTD.

Suit 3, 61A Hill Street, Roseville, N.S.W. 2069

P.O. Box 8, Turramurra, N.S.W.2074
Phone: (02) 46 3014, (02) 46 3015
Telex: AA24457

Perth:
3 Topaz Gardens
Edgewater 6027
(09) 306 2056

Aggressively structured dealer pricing

BARS AND STRIPES

ASP's Australian made BARCODE READER connects between the keyboard and IBM PC/XT/AT or clones. When a barcode is scanned the PC is tricked into thinking the scanned characters have been typed on the keyboard, so there are no software hassles! Including wand and cable **$649** plus Sales Tax. We also make RS232 Readers, Readers/Printers, Label Printing Software, OEM Modules, combined Video Terminal/Barcode Reader and Custom Keyboards for the PC/XT/AT. Ring for brochure and prices.

asp microcomputers **(03) 500 0628**

KAYPRO

AMERICAN QUALITY

KAYPRO 286i
AT Compatible
from $3,700

KAYPRO 386
from $8,900

KAYPRO PC
from $2,300

Full 12 Months Warranty

FIFTH GENERATION
Systems Pty Ltd
(03) 29 2600
Camberwell, Victoria

WHY PAY THEIR PRICES ?

Seagate ST225 & cont	A$790
Tandon Business Card 21	A$805
80286 Speed Card	A$385
80287 Co-processor	from A$355
EGA Card	from A$265

(all above prices include post)

We can also supply add-on cards, mother boards, coloured printer ribbons, manuals and more.

Public domain software for IBM from $5 and Amiga from A$9.
(both plus postage)

SHAW
Box 9573, G.P.O., Hong Kong
(9 Peak Mansions, 110-116 Peak Rd., Hong Kong)

FREE - 10 Coloured Disks from each **VALUE ADS** advertiser for their first purchaser each month to name all pages where **VALUE ADS** appear.

```
                JZ      IW_1                    ;ZR indicates match found
                STC                             ; else CY
IW_1:
                POP     DI                      ;Restore registers
                POP     CX
                POP     AX
                RET

IS_WHITE        ENDP

;=====================================================================
;  Make the character in AL UPPER case.
;---------------------------------------------------------------------
MAKE_UC         PROC    NEAR

                CMP     AL,'a'                  ;If between a and z
                JB      UC_1
                CMP     AL,'z'

                JA      UC_1
                SUB     AL,20H                  ;Make upper case
UC_1:
                RET
MAKE_UC         ENDP

;=====================================================================
;  Position SI to the next char after a CR.  Start search with current
;  char.
;---------------------------------------------------------------------
NEXT_LINE       PROC    NEAR

                MOV     AL,[SI]                 ;Examine current char
NL_1:
                CMP     AL,CR                   ;Is it CR?
                JE      NL_2                    ; yes, jump
                CALL    GET_CHAR                ; no, get next char
                JMP     NL_1                    ;  and try again
NL_2:
                CALL    GET_CHAR                ;Go to first char after CR
                RET

NEXT_LINE       ENDP

;=====================================================================
;       This proc helps resolve references to other menus made with
;  EXECUTE commands.  If entered with AX=FFFF, the calling procedure has
;  a reference it needs to satisfy.  If an address has been entered in
;  the table for that name, the address is returned and the reference is
;  satisfied.  If not, a "IOU" is inserted in the table.
;       If entered with AX != FFFFh, the calling procedure is supplying the
;  starting address of the MENU named at PATH_BUF, and asking that these
;  be entered into the table to satisfy a reference.  If the name is found
;  in the table, left in a previous bookmark, the reference is satisfied
;  and the entry is marked "USED". Any further use of that name generates
;  an error.
;       For a forward reference, the structure is:
;               ASCIIZ string
;               WORD - Address of the start of the menu that
;                       contains the reference (menu_head)
;               WORD - Offset from the end of menu header that
;                       is the destination for the fix-up
;       For a POST:
;               ASCIIZ string
;               WORD - Address in output file of menu
;               WORD - 0FFFFh
;  Possibilities:
;       1) Post a MENU not previously requested
;       2) Post a MENU previously requested
;       3) Request a MENU previously posted
;       4) Ask for a MENU not previously posted
;---------------------------------------------------------------------
SEARCH_MENU_TABLE       PROC    NEAR

                PUSH    SI                      ;Save used registers
                PUSH    DI
                PUSH    DX
                PUSH    CX

;---------------------------------------------------------------------
;  AX=FFFF if request.  AX != FFFF, then post the MENU address.
;---------------------------------------------------------------------
                CMP     AX,0FFFFH               ;Switch = FFFF if request
                JE      WANT_ADR                ; to satisfy reference

;---------------------------------------------------------------------
;  AX contains the output file offset of a menu to post in this table.
;  If the name is in the table, it was referenced earlier and we can go
;  back and fix it up.  If the name is NOT in the table, post it.
;---------------------------------------------------------------------
                CALL    MENU_LOOK               ;Changes SI
                JNC     SMT_7                   ;Match was found if NC

;---------------------------------------------------------------------
;  1) Post a menu not previously requested. No match found.  Create a
;  new entry for this menu.  SI points to end of table.
;  Copy the name from the buffer to the menu table.
;---------------------------------------------------------------------
                INC     NEW_REF                 ;Add a new reference
                MOV     CX,0FFFFH               ;POST code
SMT_1:
                MOV     DI,OFFSET PATH_BUF      ;Name of MENU is here
;---------------------------------------------------------------------
;  Copy menu name to menu_name_table
;---------------------------------------------------------------------
SMT_5:
                MOV     DL,[DI]                 ;Get char in DL
                INC     DI                      ;Point to next
                MOV     [SI],DL                 ;Save this char in table
                INC     SI                      ;next destination
                OR      DL,DL                   ;Was that last byte?
                JNZ     SMT_5                   ; no, get more

;---------------------------------------------------------------------
;  Make AX into offset from buffer start.  Save in menu table.
;  CX contains either offset from menu_buf of reference or FFFF (POST).
;---------------------------------------------------------------------
                MOV     WORD PTR [SI],AX        ;Menu at this address
                MOV     WORD PTR [SI][2],CX
                JMP     SHORT SMT_EXIT          ;clean up

;---------------------------------------------------------------------
;  2) Post a MENU previously requested.  SI points past the ASCIIZ name
;  in the table to the location of the forward reference.
;---------------------------------------------------------------------
SMT_7:
                INC     OLD_REF                 ;Add an old reference
                MOV     DX,WORD PTR [SI][2]     ;2nd word
                CMP     DX,0FFFFH               ; if POST, two menus have
                JE      SMT_7B                  ; the same name (error)
                CMP     DX,0FFFEH               ;Already referenced
                JNE     SMT_8                   ; is also an error
SMT_7B:
                MOV     DX,OFFSET REF_MSG       ;error
                JMP     ERROR_EXIT

SMT_8:
;---------------------------------------------------------------------
;  SI points to address of menu as offset from start of buffer.
;  SI+2 points to additional offset from end of header.
;  Address of reference is [si] + 2 + 3 * 2 * [[si]] + [si+2] !
;---------------------------------------------------------------------
                MOV     DI,WORD PTR [SI]        ;Offset into output_buf
                ADD     DI,OFFSET OUTPUT_BUF    ;Absolute memory location
                MOV     CX,WORD PTR [DI]        ;Number of entries in header
                SHL     CX,1                    ; 2 bytes per word
                ADD     DI,CX
                INC     CX                      ; 2 for first word
                SHL     CX,1
                ADD     DI,CX

                ADD     DI,WORD PTR [SI][2]
                MOV     [DI],AX                 ; reference satisfied
                MOV     WORD PTR [SI][2],0FFFEH ;Mark this entry USED
                JMP     SHORT SMT_EXIT          ;Clean up

;---------------------------------------------------------------------
;  Try and satisfy a reference.
;---------------------------------------------------------------------
WANT_ADR:
                CALL    MENU_LOOK               ;CY if no match
                JC      SMT_9

;---------------------------------------------------------------------
;  3) Request a MENU previously posted.  Entry name was in table.
;---------------------------------------------------------------------
                DEC     NEW_REF
                MOV     DX,WORD PTR [SI][2]     ;Second word
                CMP     DX,0FFFFH               ; should contain POST code
                JNE     SMT_7B                  ;if not, ERROR!

                MOV     AX,[SI]                 ;Get address of menu
                CALL    PUT_MENUBUF             ;Put lower byte
                MOV     AL,AH
                CALL    PUT_MENUBUF             ;Put upper byte

                MOV     WORD PTR [SI][2],0FFFEH ;Mark entry used
                JMP     SHORT SMT_EXIT

;---------------------------------------------------------------------
;  4) Ask for a MENU not previously posted.  Put an IOU in the table.
;---------------------------------------------------------------------
SMT_9:
                DEC     OLD_REF
                MOV     AX,MENU_HEAD            ;First entry is offset of
                SUB     AX,OFFSET OUTPUT_BUF    ; requesting menu

                MOV     CX,BX                   ;Second entry is offset past
                SUB     CX,OFFSET MENU_BUF      ; the menu header

                ADD     BX,2                    ;Leave room for address

                JMP     SMT_1                   ;Go create table entry
SMT_EXIT:
                POP     CX                      ;Restore registers
                POP     DX
                POP     DI
                POP     SI
                RET

SEARCH_MENU_TABLE       ENDP

;=====================================================================
;  Look for a name in the menu.  If carry is set, no match was found
;  and SI points to the end of the table.  If carry is clear, match was
;  found and SI points to address word after entry.
;  SI is changed.
;---------------------------------------------------------------------
MENU_LOOK       PROC    NEAR

                PUSH    DI                      ;Save registers
                PUSH    DX

                MOV     SI,OFFSET MENU_NAME_TBL ;Known names
ML_1:
                CMP     BYTE PTR [SI],0         ;If 0, end of table
                JNE     ML_3                    ; else compare entry
                STC                             ;signal error
ML_2:
                POP     DX                      ;Restore registers
                POP     DI
                RET
ML_3:
                MOV     DI,OFFSET PATH_BUF      ;Name to find
                CALL    STR_CMP                 ;CY if no match
                JNC     ML_2                    ;Return result
                ADD     SI,4                    ;Skip past addresses
                JMP     ML_1                    ;Check next table entry

MENU_LOOK       ENDP

;=====================================================================
;  Interpret the contents of the quoted string and write to output buffer.
;  Entered with SI pointing to the beginning quote.  An illegal character
;  or combination produces an error and terminates processing.
;---------------------------------------------------------------------
TKN_STRING      PROC    NEAR

                CMP     BYTE PTR [SI],QUOTE     ;Must point to quoted string
                JNE     TS_ERR                  ; or syntax error.

                PUSH    DI                      ;Save used register
TS_1:
                MOV     SHIFT_FLAGS,0           ;Clear shift flags
TS_1AA:
                CALL    GET_CHAR                ;Get next char
                CMP     AL,CR                   ;If not CR

                JNE     TS_QUOTE                ; go to next test
TS_ERR:
                JMP     SC_ERR                  ;Report a syntax error
TS_QUOTE:
                CMP     AL,QUOTE                ;If quote
                JNE     TS_1A
TS_EXIT:
                XOR     AL,AL                   ; make string asciiz
                CALL    PUT_MENUBUF             ; and write to buffer

                CALL    NEXT_LINE               ;Position to next line
                POP     DI                      ;Restore register
```

COMPUTER SUPPLIES

BY MAIL ORDER

QUALITY STYLE VALUE

DISKETTES

5¼″ FROM $1.20 each

- Life Time Warranty
- Complete with Jackets Labels and W/P Tabs
- Suitable for single and double sided disc drives
- 40 track and 80 track formats

HIGHEST QUALITY EUROPEAN MANUFACTURED DISCS FOR BUSINESS AND HOME USE PACKED IN BULK OR IN OUR STYLISH PLASTIC LIBRARY CASES

Price Per Disc	10+	100+	1000+
5¼″ DS DD	$1.40	$1.30	$1.20

Supplied in Plastic Library Case add 50 cents per disc

DELUXE DISKETTE STORAGE BOXES

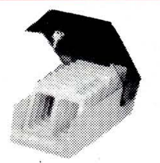
- Anti Static Protection
- Smoked Lid and High Impact Plastic Base
- Easy Access Handle for Opening and Carrying
- Hinged Lockable Lid

Holds 120 x 5¼″ diskettes

New Double Row Filing System

DD120L 1+ $25.00
3+ $24.00

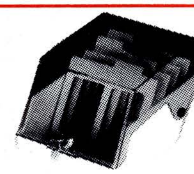
DD-120L



Holds 100 x 5¼″ diskettes

DD 100L 1+ $20.00
3+ $19.00

DD-100L



Holds 50x5¼″ diskettes

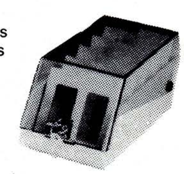
DD 50L 1+ $18.00
3+ $17.00

DD-50L

Holds 80x3½″ diskettes
Will accept 3″ diskettes

DD 80L 1+ $24.00
3+ $23.00

DD-80L



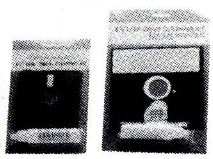
Holds 40x3½″ diskettes
Will accept 3″ diskettes

DD 40L 1+ $16.00
3+ $15.00

DD-40L

DISC CARE

Disc Cleaning Kits
— with cleaning fluid



3½″ discs 1+ $12.00
3+ $10.00
5¼″ discs 1+ $12.00
3+ $10.00

DISC NOTCHER

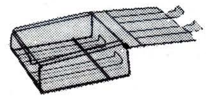
- Converts 5¼″ SS discs to DS
- Doubles disc storage capacity

DNI 1+ $12.00
3+ $10.00

PRINTER STANDS

PS1 80 clm

PS2 80 clm   PS3 132 clm



PS4 80 clm

PS1 .... 1+ $25
3+ $23

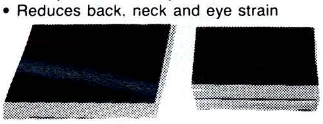
PS2 .... 1+ $35
3+ $32

PS3 .... 1+ $40
3+ $37

PS4 .... 1+ $90
3+ $85

MONITOR SWIVEL STANDS

- Full 360° rotation • 25% tilt capability
- Handy control for adjustment and lock
- Reduces back, neck and eye strain

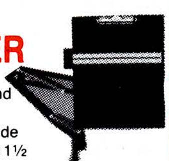


SS1-14″   SS2-12″

SS1 1+ $28
3+ $27

SS2 1+ $27
3+ $26

ADJUSTABLE COPY HOLDER



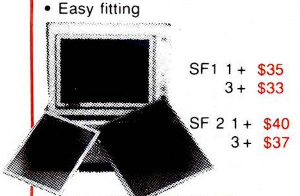
- Easily positioned and adjusted
- Slide line guide
- Size 9½ × 11½

CH1 1+ $36, 3+ $33

H1

SCREEN FILTERS

- Reduced eye strain
- Easy fitting



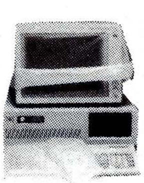
SF1 1+ $35
3+ $33

SF 2 1+ $40
3+ $37

SF1 12″   SF2 14″

DUST COVER

Suits IBM PC + look alikes



DC1 1+ $20
For 84 key keyboard
3+ $18

DC2 1+ $20
For 100 key keyboard
3+ $18

DC1

DUST COVER AND COPY HOLDER

- Combines two functions in one set
- Flexible clamps for easy fitting

HH1
1+ $20
3+ $18

HH1

DISK ORGANISER

- Keep your disc and desk organised
- Display up to 15 discs
- Disc index
- Compartment for labels, rulers etc

HH2
1+ $20
3+ $18

HH2

PLASTIC LIBRARY CASES

HH3 Holds 10x5¼″ Diskettes
1+ $5.00 + $4.00

HH4 Holds 10x3½″ Diskettes
1+ $5.00
5+ $4.00

Order to: **HALCOM HOLDINGS PTY LTD.**

P.O. BOX 106, Wahroonga, NSW 2076
24 hour answering service for orders

(02) 489-0106

Prices include sales tax but exclude delivery

Order Value	Postage
$5+	$2
$10+	$2
$25+	$4
$50+	$6

Purchase Orders Over $50 accepted from Govt. & Educational Bodies & listed Co's

Tax Exempt Prices available

Enquiries (02) 487-3781

```
                RET                             ; and leave
TS_1A:
                CMP     AL,"{"                  ;Key name follows
                JE      SPEC_CHAR               ;Go snif it out

                CMP     SHIFT_FLAGS,0           ;If any shift keys on
                JNE     DO_XLAT                 ; do translation
                XOR     AH,AH                   ;Else, ASCII output of AL

;-----------------------------------------------------------------------
; If AH=0, output the code in AL; If AH != 0, output AH, then AL.
OUTPUT_CODE:
                OR      AH,AH                   ;If AH=0
                JZ      OC_1                    ; output AL only
                XCHG    AH,AL                   ;Switch
                CALL    PUT_MENUBUF             ;Write the high byte
                XCHG    AH,AL                   ;restore AL
OC_1:
                CALL    PUT_MENUBUF             ;Put AL in buffer
                JMP     TS_1                    ;Get another character

;-----------------------------------------------------------------------
; These keys may be valid with CTRL and ALT, but not SHIFT
;-----------------------------------------------------------------------
DO_XLAT:
                CMP     SHIFT_FLAGS,_SHIFT      ;Is SHIFT on?
                JNE     TS_1B
DEAD_KEY_ERROR:
                MOV     DX,OFFSET DEAD_KEY_MSG  ;Invalid key combo
                JMP     ERROR_EXIT
TS_1B:
;-----------------------------------------------------------------------
; See if the key is in the table.
;-----------------------------------------------------------------------
                CALL    MAKE_UC                 ;Make upper case

                MOV     AH,AL                   ;Save original char
                MOV     DI,OFFSET KEY_TBL_1     ;Source for compare
                MOV     CX,DI                   ;Save start of table
TS_2:
                MOV     AL,[DI]                 ;Get char from table
                INC     DI                      ;Point to next
                OR      AL,AL                   ;If 0, AL was illegal char
                JE      DEAD_KEY_ERROR
                CMP     AL,AH                   ;Do we have a match?
                JNE     TS_2                    ;No, try again
                DEC     DI                      ;Backup pointer
                MOV     AX,DI                   ;Have a match if here
                SUB     AX,CX                   ;Offset into table

;-----------------------------------------------------------------------
; Found a match.  Tediously calculate output byte.
;-----------------------------------------------------------------------
                CMP     AL,25                   ;If A-Z
                JBE     IS_ALPHA                ; process as alpha keys
                SUB     AL,26                   ;Remove alpha bias

                CMP     SHIFT_FLAGS,_CTRL       ;Go perform CTRL combos
                JE      TS_4
                                                ;These are ALT combos
                CMP     AL,11
                JA      DEAD_KEY_ERROR          ;Too high
                ADD     AX,0FE78H               ;Output 2 bytes
                JMP     OUTPUT_CODE
TS_4:                                           ;CTRL combos
                SHL     AL,1                    ;multiply by 2
                MOV     DI,OFFSET KEY_TBL_2
                ADD     DI,AX                   ;Find word in table
                MOV     AX,[DI]                 ;Load into AX
                OR      AX,AX                   ;If zero
                JZ      DEAD_KEY_ERROR          ; this combo not allowed
                JMP     OUTPUT_CODE             ; else write it

;-----------------------------------------------------------------------
; CTRL/ALT alphabet combinations.
;-----------------------------------------------------------------------
IS_ALPHA:
                CMP     SHIFT_FLAGS,_ALT
                JE      TS_5
                INC     AL                      ;ALT is simple, add 1
                JMP     OUTPUT_CODE
TS_5:
                MOV     DI,OFFSET KEY_TBL_3     ;CTRL keys combos
                ADD     DI,AX                   ;Add offset to
                MOV     AL,[DI]                 ; get char code
                MOV     AH,0FEH                 ;Signal extended ASCII
                JMP     OUTPUT_CODE             ;Send it to buffer

;-----------------------------------------------------------------------
; Here the {strings} are translated to their equivalent keystrokes.
; Move the key name into the ASCIIZ buffer.
;-----------------------------------------------------------------------
SPEC_CHAR:
                MOV     DI,OFFSET PATH_BUF
SC_1:
                CALL    GET_CHAR                ;Get char inside brace

                CMP     AL,'{'                  ;If doubled, use {
                JNE     SC_2                    ;Jump for other chars
                CMP     DI,OFFSET PATH_BUF      ;If = no chars have been
                JE      OC_1                    ; processed yet. {{
SC_ERR:
                MOV     DX,OFFSET SYNTAX_MSG
                JMP     ERROR_EXIT
SC_2:
                CMP     AL,QUOTE                ;If char is quote
                JE      SC_ERR

                CMP     AL,'}'                  ;Close brace?
                JE      SC_3                    ; go search table
                CALL    MAKE_UC                 ;Make Upper case
                STOSB                           ;Put char in buffer
                JMP     SC_1                    ;Continue to copy key name
SC_3:
                XOR     AL,AL                   ;Make asciiz
                STOSB
                PUSH    SI                      ;Save register
                MOV     SI,OFFSET KEY_NAME_TBL  ;Search this table
                MOV     AX,OFFSET PATH_BUF      ; for this entry
                CALL    TABLE_LOOKUP
                POP     SI                      ;Restore register

;-----------------------------------------------------------------------
; Return # of entry in table or FFh if not found.
;-----------------------------------------------------------------------
                CMP     AL,0FFH
                JE      SC_ERR

                OR      AL,AL                   ;0 = Turn SHIFT on
                JNZ     SC_4
                MOV     SHIFT_FLAGS,_SHIFT
                JMP     TS_1AA
SC_4:
                DEC     AL                      ;0 = Turn CTRL on
                JNZ     SC_5
                MOV     SHIFT_FLAGS,_CTRL
                JMP     TS_1AA
SC_5:
                DEC     AL                      ;0 = Turn ALT on
                JNZ     SC_6
                MOV     SHIFT_FLAGS,_ALT
                JMP     TS_1AA

;-----------------------------------------------------------------------
; Test for the Function keys (40 combinations).
;-----------------------------------------------------------------------
SC_6:
                DEC     AL                      ;Adjust key number
                CMP     AL,9                    ;Keys 0-9
                JA      SC_10                   ;Can't be function key
                ADD     AL,3BH                  ;Key code
                MOV     AH,SHIFT_FLAGS          ;Test for shift states

                CMP     AH,_SHIFT               ;For shift
                JNE     SC_7
                ADD     AL,19H                  ;Add 19h
SC_7:
                CMP     AH,_CTRL                ;For CTRL
                JNE     SC_8
                ADD     AL,23H                  ;Add 23h
SC_8:
                CMP     AH,_ALT                 ;For ALT
                JNE     SC_9
                ADD     AL,2DH                  ;Add 2dh
SC_9:
                MOV     AH,0FEH                 ;Say this is extended ascii
                JMP     OUTPUT_CODE             ;Dump the bytes

;-----------------------------------------------------------------------
; ALT is not allowed for these keys.
;-----------------------------------------------------------------------
SC_10:
                CMP     SHIFT_FLAGS,_ALT        ;If Alt's not on
                JNE     SC_10B                  ; jump
SC_10A:
                JMP     DEAD_KEY_ERROR          ; else, error
SC_10B:
                SUB     AL,10                   ;Eliminate BIAS
                JNZ     SC_11
                MOV     AL,01BH                 ;ESC key
                JMP     OC_1
SC_11:
                DEC     AL                      ;TAB key
                JNZ     SC_13
                CMP     SHIFT_FLAGS,0           ;Any shift keys on?
                JE      SC_12                   ; no, jump
                CMP     SHIFT_FLAGS,_SHIFT      ;SHIFT only is allowed
                JNE     SC_10A                  ; else error
                MOV     AX,0FE0FH               ;SHIFT-TAB
                JMP     OUTPUT_CODE             ;to output
SC_12:
                MOV     AL,9                    ;Normal TAB
SC_12A:
                JMP     OC_1

;-----------------------------------------------------------------------
; These keys are the same alone or with SHIFT, but CTRL is different.
;-----------------------------------------------------------------------
SC_13:
                DEC     AL                      ;Remove bias
                XOR     AH,AH                   ;Zero AH
                MOV     DI,OFFSET KEY_TBL_4     ;Table of SHIFT/CTRL values
                SHL     AX,1                    ;Make into offset
                ADD     DI,AX                   ; from start of table
                MOV     DH,SHIFT_FLAGS          ;If CTRL
                CMP     DH,_CTRL
                JNE     SC_14
                INC     DI                      ; move one byte further
SC_14:
                MOV     DL,[DI]                 ;Get char from table
                OR      DL,DL                   ; =0 if illegal
                JZ      SC_10A
                XCHG    AL,DL                   ;Put offset in DL
                CMP     DL,2                    ;What key?
                JE      SC_12A                  ;If BS, all ascii
                JA      SC_15                   ;above, all extended
                CMP     DH,_CTRL                ;CTRL-ENTER is special
                JNE     SC_12A
SC_15:
                MOV     AH,0FEH                 ;Add extended code
                JMP     OUTPUT_CODE

TKN_STRING      ENDP

;=======================================================================
; Read from the BDF file into a buffer.  If an EOF is found, perform
; the final cleanup and return to the main procedure.
; (must also keep track of file pointer and signal when EOF)
;-----------------------------------------------------------------------
REFRESH_BUFFER  PROC    NEAR

                PUSH    BX
                PUSH    CX
                PUSH    DX

                MOV     AH,42H                  ;Move file pointer
                XOR     AL,AL                   ; offset from begining
                MOV     BX,INPUT_HNDL           ;File handle
                XOR     CX,CX                   ;Offset CX:DX
                MOV     DX,INPUT_HNDL_PTR
                INT     21H                     ;Thru DOS
                JC      READ_ERR

;-----------------------------------------------------------------------
; Fill buffer.
;-----------------------------------------------------------------------
                MOV     AH,3FH                  ;Read from handle fn
                MOV     BX,INPUT_HNDL
                MOV     CX,INPUT_BUF_LEN        ;Number bytes to read
                MOV     SI,OFFSET INPUT_BUF
                MOV     DX,SI                   ;DS:DX destination

                CMP     [INPUT_HNDL_PTR],0      ;If start of file
                JNE     NOT_FIRST_READ
                MOV     BYTE PTR [SI],20H       ;Make a current char
                DEC     CX                      ;Read one less byte
                INC     DX                      ;New destination
NOT_FIRST_READ:
                INT     21H                     ;Thru DOS
                JNC     READ_OK
```

Sujon

SEAGATE 20MB Hard Disk
$680
DTC Controller, Cables
12 Months — Warranty

EPSON FX-1000 Printer
$940
Tractor Feed, I/F Cable
12 Months — Warranty

ULTRA PC XT Turbo
$2700
From — Imagineering
4.77/8Mhz, 640Kb RAM,
360K Floppy, 20Mb H/Disk
Serial/Parallel/Games,
ADI Monitor & MS-DOS 3.2
12 Months — Warranty

EGA Monitor Kit
$1200
ADI Hi-Res EGA Monitor
(720x350x64 colours) with
Sakata EGA Adaptor
6 Months — Warranty

LOTUS 123 Rel 2.01 $640
Lotus HAL $215
SYMPHONY $910
Dbase III + $910
Multimate Ver.3.31 $580
Multimate Advantage $770

Prices include Sales Tax
Delivery Extra

Sujon Computer Services,
905 Toorak Road,
CAMBERWELL 3124

Phone: (03) 299 2100
Fax: (03) 29 1307

Help for C Programmers

You can now create sophisticated applications **FAST** with our C compilers, database and screen libraries and tools.

With **dBX,** the dBASE to C source code translator, you can run your dBASE programs on computers that do not support dBASE. Makes your programs run like lightning.

STOP wasting time debugging your programs the hard way . . . one at a time. Use **PC-LINT** to find bugs, glitches and inconsistencies in your **C** programs. Saves hours of development time.

Use the **BEST** Database and Report Generators available. **C-tree** provides multi-user locking routines for Unix, Zenix, MPM and DOS 3.1. **R-tree** is a powerful multi-file, multi-line report generator. Includes source code.

FULL RANGE of products available including Graphics, C interpreters, Make, Editors, Wendin, Under-C, Greenleaf, Faircom, Softfocus, Turbo C, Microport System V/AT Unix and more.

Try our **FREE** 24 hour Bulletin Board (02) 560 3607. Hundreds of C files and programs available for downloading.

For your **FREE** C Programmer's Catalogue, phone Rick Polito on (02) 233 3455 or write to:

MICROMART PTY. LTD.
56 Percival Road, Stanmore 2048

TANDY 1000

Everything for the 1000!

- COMBI/1000 - Single Slot expansion for the Model 1000 with up to 640K RAM, RS232, DMA and even a battery backed up clock calendar. 12 month warranty.
- HARD DISK KITS - 20 Megabyte
- EXPANSION BOARD FOR THE NEW EX - Similar to Tandy's except ours support both Tandy and ASP expansion modules.
- RS232/CLOCK MODULES - for EX and existing Tandy Memory PLUS Expansion Board
- DUAL RS232/CLOCK BOARDS - for new SX Model.
- FLOPPY DRIVES & CASES - for all Model 1000s.
- BARCODE READER - fits on the Model 1000 and 1000 SX keyboard line.
- 2 & 4 MEGABYTE RAM EMS

asp microcomputers (03) 500 0628
P.O. Box 259, Caulfield East 3145

dBase III+

(CLONE)

$ 369 incl. S.T.

Why pay $ 1,470 R/R for dBase III —, when you can pay $ 369 for the same thing, only better! dBXL is a product which has been designed by an American Company, WORDTECH SYSTEMS.
dBXL uses the same syntax as dBase III — but with many improvements.
Ring now for a detailed brochure.

★ DEALER ENQUIRIES WELCOME.

Copy - Cat Software

13 OUTLOOK CRESCENT,
BRIAR HILL,
VICTORIA 3088
(03) 434 7634
(03) 434 7648

FREE - 10 Coloured Disks from each **VALUE ADS** advertiser for their first purchaser each month to name all pages where **VALUE ADS** appear.

```
READ_ERR:
                MOV     DX,OFFSET READ_MSG
                JMP     ERROR_EXIT
READ_OK:
                ADD     INPUT_HNDL_PTR,AX           ;Add bytes read
                SUB     DX,SI                       ;Calculate ending address
                ADD     AX,DX                       ; of our buffer
                MOV     INPUT_BUF_END,AX            ; and save it

                POP     DX                          ;Restore registers
                POP     CX
                POP     BX
                RET

REFRESH_BUFFER  ENDP

;=====================================================================
;  Copy the word at SI into a buffer and make it asciiz
;---------------------------------------------------------------------
MAKEZ           PROC    NEAR

                PUSH    DI
                MOV     DI,OFFSET PATH_BUF          ;Destination
                PUSH    DI
MZ_1:
                CALL    IS_WHITE                    ;Examine char at SI
                JNC     MZ_2

                MOV     AL,[SI]                     ;Get the char
                CMP     AL,CR                       ;Is it CR?
                JE      MZ_2                        ; yes, terminate string
                CALL    MAKE_UC                     ; else, change to lower case
                STOSB                               ;  save at DI
                CALL    GET_CHAR                    ;Get next char
                JMP     MZ_1
MZ_2:
                XOR     AL,AL                       ;Make ASCIIZ
                STOSB

                POP     AX                          ;Return buffer address
                POP     DI                          ;Restore pointer
                RET

MAKEZ           ENDP

;=====================================================================
;  Get a char from the input buffer.  If past the end of the buffer,
;  refresh the buffer.  Check for EOF (SI = INPUT_BUF_END != BUF_LEN)
;  If comments are detected, they are weeded out.
;---------------------------------------------------------------------
COMMENT_FLAG    DB      0                           ;=1 if inside comment

GET_CHAR        PROC    NEAR
;---------------------------------------------------------------------
;  Check buffer for pointer past end.
;---------------------------------------------------------------------
                PUSH    AX                          ;Save register
                INC     SI                          ;Advance pointer
                MOV     AX,SI                       ;Current location
                SUB     AX,OFFSET INPUT_BUF         ; minus start
                CMP     AX,INPUT_BUF_END            ; longer than allowed
                POP     AX                          ;(restore pointer)
                JB      GC_1                        ; no need to refresh
                CALL    REFRESH_BUFFER              ;Attempt to load buffer

;---------------------------------------------------------------------
;  AX contains the number of chars read.  If AX=0, unexpected EOF.
;---------------------------------------------------------------------
                OR      AX,AX                       ;# chars read
                JNZ     GC_1                        ;jump if not 0
                MOV     DX,OFFSET EOF_MSG
                JMP     ERROR_EXIT

;---------------------------------------------------------------------
;  check for, and eliminate comments
;---------------------------------------------------------------------
GC_1:
                MOV     AL,[SI]                     ;Get new char
                CMP     AL,CR                       ;If new line
                JNE     GC_3
                MOV     COMMENT_FLAG,0              ; reset comment
                INC     SOURCE_LINE                 ; next line
GC_2:
                CMP     COMMENT_FLAG,0              ;If inside comment
                JNE     GET_CHAR                    ; read until CR
                RET
GC_3:
                CMP     AL,';'                      ;If this isn't a comment
                JNE     GC_2                        ; then continue
                INC     COMMENT_FLAG                ;else read until CR
                JMP     GET_CHAR

GET_CHAR        ENDP

;=====================================================================
PUT_MENUBUF     PROC    NEAR

                MOV     [BX],AL                     ;Write byte to [bx]
                INC     BX                          ;Move pointer
                RET

PUT_MENUBUF     ENDP

;=====================================================================
;  Buffer Allocation area
;---------------------------------------------------------------------
PC              =       $
LAST_BYTE       =       PC

PATH_BUF        =       PC                          ;DB 64 DUP (?)
PC              =       PC + 64

INPUT_BUF       =       PC                          ;DB INPUT_BUF_LEN DUP(?)
PC              =       PC + INPUT_BUF_LEN

OUTPUT_BUF      =       PC                          ;DB OUTPUT_BUF_LEN DUP(?)
PC              =       PC + OUTPUT_BUF_LEN

MENU_BUF        =       PC                          ;DB MENU_BUF_LEN DUP(?)
PC              =       PC + MENU_BUF_LEN

MENU_NAME_TBL   =       PC                          ;DB MENU_TBL_ELN DUP(?)
PC              =       PC + MENU_TBL_LEN

;---------------------------------------------------------------------
CSEG      ENDS
          END      ENTPT
```

TECHNOLOGY INTERFACE

The Turbo XT 100

The base unit includes the following:
Turbo 8088 (4.77/8Mhz), in an AT Chassie 640Kb RAM Standard, 150 Watt Power Supply Mono or Colour Graphic Card, Multi I/O Card, Disk Controller and a 360 Kb Disk Drive. AT Style Keyboard, & a 12 month warranty. (System does not include monitor. Do it yourself or if you wish, order options, and we will install free.)

BASE UNIT **$1195** (tax inc.)

OR CHOOSE OUR

The Turbo AT 1000 Base System

The base unit includes the following:
Turbo 80286 (6/8Mhz), Turbo & Reset button, 512Kb RAM Standard, 200 Watt Power Supply, Colour Graphics Card, no wait state jumper, Disk Controller, 1.2 Mb disk drive, Phoenix Bios AT Enhanced Keyboard, & 12 Mth warranty. Real Time Clock, I/O Card. (System does not include Monitor.) Order any options, and we will install free.

BASE UNIT **$2495** (tax inc.)

SUPER SOFTWARE SPECIAL:

OPEN ACCESS II	CALL
MSWORD	$745
MULTIMATE 3.3	$745
WORDCRAFT	$745
MULTIPLAN 2.0	$349
MIRROR	$89

20 MB HARD DISK DRIVE & CONTROLLER	$999
TVMMD3 14" COLOUR MONITOR	$750
TVMMD7 14" COLOUR MONITOR INCLUDING EGA CARD	$1399
SAMSUNG TTL MONITOR	$225
OKI PRINTERS	CALL
INTERFACE 10 LASER PRINTER	$7500
INTERFAX 2 FACSIMILE	$2599

Ring the TECHNOLOGY INTERFACE * HOTLINE for your nearest Technology Interface Centre on

(02) 684 4999 (03) 329 2922 (08) 316 722

SYDNEY MELBOURNE ADELAIDE PERTH NEWCASTLE WOLLONGONG

A DIVISION OF CASTLE TECHNOLOGY HOLDINGS LIMITED • ALL PRICES INC. TAX. DEALER INQ. CALL SALLY.

```
100 REM -- BASIC PROGRAM TO CREATE MAKEBAR.COM
110 OPEN "MAKEBAR.COM" AS #1 LEN = 1
120 FIELD #1,1 AS A$
130 CHECKSUM = 0
140 FOR I = 1 TO  260
150    LINESUM = 0
160    FOR J = 1 TO 8
170       READ BYTE
180       CHECKSUM = CHECKSUM + BYTE
190       LINESUM = LINESUM + BYTE
200       IF (BYTE < 256) THEN LSET A$ = CHR$(BYTE)
210       PUT #1
220    NEXT J
230    READ LINECHECK
240    IF LINECHECK <> LINESUM THEN PRINT "Error in Line";280 + 10 * I
250 NEXT I
260 CLOSE
270 IF CHECKSUM = 206640 THEN PRINT "Successful Completion!" : END
280 PRINT "COM file is not valid!" : END
290 DATA   233,   90,    2,   77,   65,   75,   69,   66,  677
300 DATA    65,   82,   32,   49,   46,   48,   32,   40,  394
310 DATA    99,   41,   32,   49,   57,   56,   55,   44,  433
320 DATA    32,   90,  105,  102,  102,   45,   68,   97,  641
330 DATA   118,  105,  115,   32,   80,  117,   98,  108,  773
340 DATA   105,  115,  104,  105,  110,  103,   32,   67,  741
350 DATA   111,  114,  112,   13,   10,   36,   26,   82,  504
360 DATA   111,   98,  101,  114,  116,   32,   76,   46,  694
370 DATA    32,   72,  117,  109,  109,  101,  108,    0,  648
380 DATA     0,    0,    0,  255,  255,    0,    0,    0,  510
390 DATA     0,    0,    0,    0,  255,    0,   65,   83,  403
400 DATA    75,    0,   67,   82,    0,   69,   88,   69,  450
410 DATA    67,   65,   84,   69,    0,   73,   78,   80,  536
420 DATA    85,   84,    0,   77,   69,   78,   85,    0,  478
430 DATA    79,   80,   84,   73,   79,   78,    0,   80,  553
440 DATA    82,   79,   71,   82,   65,   77,    0,   84,  540
450 DATA    89,   80,   69,    0,   77,   69,   78,   68,  530
460 DATA     0,   69,   78,   68,    0,    0,   83,    0,  298
470 DATA    67,    0,   65,    0,   70,   49,    0,   70,  321
480 DATA    50,    0,   70,   51,    0,   70,   52,    0,  293
490 DATA    70,   53,    0,   70,   54,    0,   70,   55,  372
500 DATA     0,   70,   56,    0,   70,   57,    0,   70,  323
510 DATA    49,   48,    0,   69,   83,   67,    0,   84,  400
520 DATA    65,   66,    0,   69,   78,   84,   69,   82,  513
530 DATA     0,   66,   83,    0,   72,   79,   77,   69,  446
540 DATA     0,   80,   71,   85,   80,    0,   69,   78,  463
550 DATA    68,    0,   80,   71,   68,   78,    0,   73,  438
560 DATA    78,   83,    0,   68,   69,   76,    0,   85,  459
570 DATA     0,   68,    0,   76,    0,   82,    0,    0,  226
580 DATA    65,   66,   67,   68,   69,   70,   71,   72,  548
590 DATA    73,   74,   75,   76,   77,   78,   79,   80,  612
600 DATA    81,   82,   83,   84,   85,   86,   87,   88,  676
610 DATA    89,   90,   49,   50,   51,   52,   53,   54,  488
620 DATA    55,   56,   57,   48,   45,   61,   92,   91,  505
630 DATA    93,    0,   59,    0,    3,  254,   34,    0,  443
640 DATA     0,    0,    0,    0,   30,    0,    0,    0,   30
650 DATA     0,    0,    0,    0,    0,    0,   31,    0,   31
660 DATA     0,    0,   28,    0,   27,    0,   29,    0,   84
670 DATA    30,   48,   46,   32,   18,   33,   34,   35,  276
680 DATA    23,   36,   37,   38,   50,   49,   24,   25,  282
690 DATA    16,   19,   31,   20,   22,   47,   17,   45,  217
700 DATA    21,   44,   13,  254,    8,  127,   71,  119,  657
710 DATA    73,  132,   79,  117,   81,  118,   82,    0,  682
720 DATA    83,    0,   72,    0,   80,    0,   75,  115,  425
730 DATA    77,  116,    0,    0,    0,   85,  115,   97,  490
740 DATA   103,  101,   58,   32,   77,   65,   75,   69,  580
750 DATA    66,   65,   82,   32,   91,  112,   97,  116,  661
760 DATA   104,   93,  105,  110,  112,  117,  116,   95,  852
770 DATA   102,  105,  108,  101,   32,   91,  112,   97,  748
780 DATA   116,  104,   93,  111,  117,  116,  112,  117,  886
790 DATA   116,   95,  102,  105,  108,  101,   36,   67,  730
800 DATA    97,  110,   39,  116,   32,   79,  112,  101,  686
810 DATA   110,   32,   70,  105,  108,  101,   36,   69,  631
820 DATA   114,  114,  111,  114,   32,   82,  101,   97,  765
830 DATA   100,  105,  110,  103,   32,   70,  105,  108,  733
840 DATA   101,   36,   68,  117,  112,  108,  105,   99,  746
850 DATA    97,  116,  101,   32,   67,  109,  100,   36,  658
860 DATA    67,  109,  100,   32,   79,  117,  116,   32,  652
870 DATA    79,  102,   32,   79,  114,  100,  101,  114,  721
880 DATA    36,   85,  110,  107,  110,  111,  119,  110,  788
890 DATA    32,   67,  109,  100,   36,   77,   69,   78,  568
900 DATA    85,   32,   87,  105,  116,  104,  111,  117,  757
910 DATA   116,   32,   77,   69,   78,   68,   36,   83,  559
920 DATA   121,  110,  116,   97,  120,   32,   69,  114,  779
930 DATA   114,  111,  114,   36,   77,  105,  115,  115,  787
940 DATA   105,  110,  103,   32,   78,   97,  109,  101,  735
950 DATA    36,   66,   97,  100,   32,   77,   69,   78,  555
960 DATA    85,   32,   82,  101,  102,  101,  114,  101,  718
970 DATA   110,   99,  101,   36,   77,  105,  115,  115,  758
980 DATA   105,  110,  103,   32,   69,   78,   68,   36,  601
990 DATA    68,  101,   97,  100,   45,   75,  101,  121,  708
1000 DATA   32,  111,  114,   32,   66,   97,  100,   32,  584
1010 DATA   75,  101,  121,   36,   13,   10,   69,  114,  539
1020 DATA  114,  111,  114,   32,   65,  116,   32,   76,  660
1030 DATA  105,  110,  101,   32,   35,   32,   32,   32,  479
1040 DATA   32,   32,   32,   32,   36,  180,    9,  186,  539
1050 DATA    3,    1,  205,   33,  252,  232,   11,    0,  737
1060 DATA  232,  111,    0,  232,   91,    0,  184,    0,  850
1070 DATA   76,  205,   33,  190,  129,    0,  232,   17,  882
1080 DATA    0,  163,   71,    1,  232,   11,    0,  163,  641
1090 DATA   77,    1,  199,    6,   75,    1,    0,    0,  359
1100 DATA  195,    0,  232,  111,    2,   60,   13,  117,  730
1110 DATA    6,  186,  101,    2,  233,   28,    2,   86,  644
1120 DATA  232,   78,    2,  139,  206,   94,   43,  206, 1000
1130 DATA   11,  201,  116,  237,  191,   31,    9,  243, 1039
1140 DATA  164,   50,  192,  170,  184,    0,   61,  128,  949
1150 DATA   62,  137,    3,    0,  116,    2,  254,  204,  778
1160 DATA  186,   31,    9,  205,   33,  115,    5,  186,  770
1170 DATA  151,    2,  235,  208,  254,    6,  137,    3,  996
1180 DATA  195,  180,   62,  139,   30,   71,    1,  205,  883
1190 DATA   33,  180,   62,  139,   30,   77,    1,  205,  727
1200 DATA   33,  195,   51,  192,  162,  100,    2,  162,  897
1210 DATA   98,    2,  163,   82,    1,  191,   79,  220,  836
1220 DATA  185,  160,   15,  243,  170,  232,  135,    4, 1144
1230 DATA  191,  255,   24,  232,    6,    2,   60,   13,  783
1240 DATA  117,    5,  232,   55,    2,  235,  244,  232, 1122
1250 DATA  189,    4,   86,  190,   86,    1,  232,  115,  903
1260 DATA    1,   94,   60,  255,  117,    5,  186,  217,  935
1270 DATA    2,  235,   75,  128,   62,  100,    2,    0,  604
1280 DATA  156,   60,    6,  116,    6,  157,  117,   32,  650
1290 DATA  233,  148,    0,  157,  116,    5,  186,  186, 1031
1300 DATA    2,  235,   51,  139,  223,  176,   32,  185, 1043
1310 DATA   10,    0,  243,  170,  232,  166,    1,  232, 1054
1320 DATA  189,    2,  254,    6,  100,    2,  235,  179,  967
1330 DATA   60,    9,  117,   45,  160,   98,    2,   10,  501
1340 DATA    6,   99,    2,  116,    5,  186,  229,    2,  645
1350 DATA  235,   12,  160,   84,    1,   10,    6,   85,  593
1360 DATA    1,  116,    6,  186,   17,    3,  233,   82,  644
1370 DATA    1,  186,  255,   24,  139,  207,   43,  202, 1057
1380 DATA  180,   64,  139,   30,   77,    1,  205,   33,  729
1390 DATA  195,   60,    4,  117,   46,  128,   62,   98,  710
1400 DATA    2,    0,  117,  209,  187,  175,  204,  137, 1031
1410 DATA   62,   79,    1,   51,  192,  171,  254,    6,  816
1420 DATA   98,    2,  232,   80,    1,   60,   13,  116,  602
1430 DATA   69,  232,   43,    4,  161,   79,    1,   45,  634
1440 DATA  255,   24,  232,  166,    1,  232,  148,    1, 1059
1450 DATA  233,   80,  255,  128,   62,   98,    2,    0,  858
1460 DATA  116,   13,  128,   62,   99,    2,    0,  156,  576
1470 DATA   60,    5,  116,    8,  157,  117,   79,  186,  728
```

Fig 2 A Basic program that will create MAKEBAR.COM

string must be less than 78 characters in order to fit within the window created by SLASHBAR. Beginning on the next line, the application program commands to be executed when that option is chosen are entered. Each command must begin on a separate line, and the entire command must be contained on that line. If more keys need to be entered than can fit on a single line, multiple TYPE statements can be used.

The BDF commands

The available BDF commands, together with their syntax, are listed in the accompanying figure 'BDF commands and their syntax'. The five that remain to be discussed, EXECUTE, ASK, TYPE, INPUT , and CR, may appear only inside an OPTION block. These commands make up a kind of batch language that controls the operation of the SLASHBAR utility. At the end of each menu path is a command string that will accomplish the desired result when fed to the applications program, just as if you typed in the commands directly.

BDF commands and their syntax

PROGRAM	"string"
END	
MENU	name
MEND	
OPTION	name, "string"
EXECUTE	
ASK	"string"
INPUT	
TYPE	"string"

The EXECUTE command transfers control down the menu tree. Any option may invoke another menu by executing it. Since menu flow is one-way, lines appearing below an EXECUTE command within the same option block will never be invoked. In addition, since paths in the menu tree may not cross, two option blocks cannot execute the same menu. MAKEBAR checks for this and signals it as an error. This prevents building a circular reference into the tree, where a menu could call itself indefinitely.

The ASK command is used to prompt the user for information. The string argument appears on the screen in the upper half of the pop-up window and does not affect the output keystrokes. Because the logical use of the ASK command is to request a reply, it is usually followed by the INPUT com-

TELEX ELIMINATOR

Turns every Computer Terminal in your office into an instant Telex.

Because of the Telex Eliminator's unique ability to apply your computer's intelligence to the telex network you receive a host of benefits.

OPERATIONAL SIMPLICITY
A clear menu of instructions makes it easy for inexperienced telex users. The office word processor, with its own inherent advantages can be used to prepare messages which can be sent at any time. The system's versatility allows messages to be prepared for sending even while the unit is transmitting or receiving other telexes.

ELIMINATES YOUR TELEX MACHINE
Big saving in equipment cost and office space.

FLEXIBILITY
Works with any computer system.

CONVENIENCE & TIME SAVING
Perform all Telex functions without leaving their desks.

TEXT PREPARATION
Messages can be checked on screen before sending.

SECURITY
Confidential information sent and received, can be accessed only by chosen personnel.

PRIORITY ACCESS
Important messages can be programmed to "jump the queue".

SEND YOUR TELEXES AFTER HOURS
Big savings in line rates.

AUTOMATIC RE-TRY
Save staff time re-dialing. Enter message once, the machine will re-try at intervals until it can get through.

ANSWERBACK VERIFICATION
Automatic check that you have reached the right number.

MULTIPLE ADDRESSING
You can send your message to everyone at the touch of a key.

SYMBOLIC ADDRESSING
Send your message to selected people at the touch of a key.

INTELLIGENT INTERPRETOR
Allows standard strings to be simply coded, a big time savings for volume users.

NOTIFY FAILURES
Telex Eliminator can detect and notify you of failures in the system.

TELEX MANAGEMENT INFORMATION
Telex Eliminator will prepare telex management reports showing the status of the telex system. Logs of telexes sent and received are compiled allowing a valuable breakdown of telex usage.

If you would like to know more about what the Telex Eliminator can do for you, give us a call and let one of our representatives show you how you can have the world of communications at your fingertips.

Unix Systems Australia Pty. Ltd.

(02) 764 4566

21 Young St Concord NSW 2137
Telex AA73482

Designed and manufactured in Australia.

USA

```
1480 DATA  200,    2,  235,  162,  157,  116,    5,  176, 1053
1490 DATA   10,  232,   87,    4,  254,    6,   99,    2,  694
1500 DATA  139,   46,   79,    1,  255,   70,    0,  232,  822
1510 DATA   11,    1,   60,   13,  117,    5,  186,    4,  397
1520 DATA    3,  235,  131,  232,  225,    3,  139,  195, 1163
1530 DATA   45,  175,  204,  171,   86,  190,   31,    9,  911
1540 DATA  172,  232,   47,    4,   10,  192,  117,  248, 1022
1550 DATA   94,  232,  233,    0,  139,  195,   45,  175, 1113
1560 DATA  204,  171,  232,  250,    1,  139,  195,   45, 1237
1570 DATA  175,  204,  171,  233,  237,  254,   60,    8, 1342
1580 DATA  117,   65,  176,   10,  232,   12,    4,   86,  702
1590 DATA  139,   54,   79,    1,  173,  139,  200,  209,  994
1600 DATA  225,    3,  200,  227,   23,   81,  139,  193, 1091
1610 DATA   64,  209,  224,  139,   14,   79,    1,  129,  859
1620 DATA  233,  255,   24,    3,  193,   89,    1,    4,  802
1630 DATA   70,   70,  226,  250,  139,  203,  190,  175, 1323
1640 DATA  204,   43,  206,  243,  164,   94,  198,    6, 1158
1650 DATA   98,    2,    0,  198,    6,   99,    2,    0,  405
1660 DATA  233,  168,  254,  232,  205,    3,   60,    2, 1157
1670 DATA  117,   22,  232,  136,    0,   60,   13,  117,  697
1680 DATA    3,  233,  122,  255,  232,   96,    3,  184, 1128
1690 DATA  255,  255,  232,  222,    0,  233,  139,  254, 1590
1700 DATA   60,    0,  116,    7,   60,    7,  116,    3,  369
1710 DATA  233,  128,  254,  232,  103,    0,  232,  126, 1308
1720 DATA    1,  233,  119,  254,   87,   81,   82,   50,  907
1730 DATA  201,  128,   60,    0,  117,    8,  177,  255,  946
1740 DATA  138,  193,   90,   89,   95,  195,  139,  248, 1187
1750 DATA  232,    6,    0,  115,  243,  254,  193,  235, 1278
1760 DATA  232,  138,   21,   71,  138,   52,   70,   58,  780
1770 DATA  242,  116,   10,   78,  138,   52,   70,   10,  716
1780 DATA  246,  117,  249,  249,  195,   11,  210,  117, 1394
1790 DATA  232,  248,  195,  180,    9,  205,   33,  191, 1293
1800 DATA   91,    3,  161,   82,    1,  187,   10,    0,  535
1810 DATA   51,  210,  247,  243,  128,  194,   48,  136, 1257
1820 DATA   21,   79,   11,  192,  117,  242,  186,   68,  916
1830 DATA    3,  180,    9,  205,   33,  232,  241,  253, 1156
1840 DATA  184,  255,   76,  205,   33,  232,   52,    0, 1037
1850 DATA  115,    3,  232,    4,    0,  232,   20,    0,  606
1860 DATA  195,  138,    4,   60,   13,  116,   12,  232,  770
1870 DATA  237,    2,   60,   13,  116,    5,  232,   27,  692
1880 DATA    0,  114,  244,  195,  138,    4,   60,   13,  768
1890 DATA  116,   12,  232,  218,    2,   60,   13,  116,  769
1900 DATA    5,  232,    8,    0,  115,  244,  195,   32,  831
1910 DATA   44,   58,   10,    9,   80,   81,   87,  138,  507
1920 DATA    4,  185,    5,    0,  191,   15,    6,  242,  648
1930 DATA  174,  240,  116,    1,  249,   95,   89,   88, 1060
1940 DATA  195,   60,   97,  114,    6,   60,  122,  119,  773
1950 DATA    2,   44,   32,  195,  138,    4,   60,   13,  488
1960 DATA  116,    5,  232,  162,    2,  235,  247,  232, 1231
1970 DATA  157,    2,  195,   86,   87,   82,   81,   61,  751
1980 DATA  255,  255,  116,   84,  232,  141,    0,  115, 1198
1990 DATA   27,  254,    6,   84,    1,  185,  255,  255, 1067
2000 DATA  191,   31,    9,  138,   21,   71,  136,   20,  617
2010 DATA   70,   10,  210,  117,  246,  137,    4,  137,  931
2020 DATA   76,    2,  235,  107,  254,    6,   85,    1,  766
2030 DATA  139,   84,    2,  131,  250,  255,  116,    5,  982
2040 DATA  131,  250,  254,  117,    6,  186,   17,    3,  964
2050 DATA  233,   48,  255,  139,   60,  129,  199,  255, 1318
2060 DATA   24,  139,   13,  209,  225,    3,  249,   65,  927
2070 DATA  209,  225,    3,  249,    3,  124,    2,  137,  952
2080 DATA    5,  199,   68,    2,  254,  255,  235,   55, 1073
2090 DATA  232,   57,    0,  114,   29,  254,   14,   84,  784
2100 DATA    1,  139,   84,    2,  131,  250,  255,  117,  979
2110 DATA  204,  139,    4,  232,  101,    2,  138,  196, 1016
2120 DATA  232,   96,    2,  199,   68,    2,  254,  255, 1108
2130 DATA  235,   21,  254,   14,   85,    1,  161,   79,  850
2140 DATA    1,   45,  255,   24,  139,  203,  129,  233, 1029
2150 DATA  175,  204,  131,  195,    2,  235,  129,   89, 1160
2160 DATA   90,   95,   94,  195,   87,   82,  190,   79,  912
2170 DATA  220,  128,   60,    0,  117,    4,  249,   90,  868
2180 DATA   95,  195,  191,   31,    9,  232,  169,  254, 1176
2190 DATA  115,  245,  131,  198,    4,  235,  234,  128, 1290
2200 DATA   60,   34,  117,   13,   87,  198,    6,   81,  596
2210 DATA    1,    0,  232,  218,    1,   60,   13,  117,  642
2220 DATA    3,  233,  157,    0,   60,   34,  117,   10,  614
2230 DATA   50,  192,  232,    6,    2,  232,   28,  255,  997
2240 DATA   95,  195,   60,  123,  116,  123,  128,   62,  902
2250 DATA   81,    1,    0,  117,   18,   50,  228,   10,  505
2260 DATA  228,  116,    7,  134,  224,  232,  235,    1, 1177
2270 DATA  134,  224,  232,  230,    1,  235,  198,  128, 1382
2280 DATA   62,   81,    1,    1,  117,    6,  186,   48,  502
2290 DATA    3,  233,  111,  254,  232,  226,  254,  138, 1451
2300 DATA  224,  191,  232,    1,  139,  207,  138,    5, 1137
2310 DATA   71,   10,  192,  116,  233,   58,  196,  117,  993
2320 DATA  245,   79,  139,  199,   43,  193,   60,   25,  983
2330 DATA  118,   33,   44,   26,  128,   62,   81,    1,  493
2340 DATA    2,  116,    9,   60,   11,  119,  207,    5,  529
2350 DATA  120,  254,  235,  179,  208,  224,  191,   18, 1429
2360 DATA    2,    3,  248,  139,    5,   11,  192,  116,  716
2370 DATA  189,  235,  164,  128,   62,   81,    1,    4,  864
2380 DATA  116,    4,  254,  192,  235,  153,  191,   48, 1193
2390 DATA    2,    3,  248,  138,    5,  180,  254,  235, 1065
2400 DATA  142,  191,   31,    9,  232,   64,    1,   60,  730
2410 DATA  123,  117,   12,  129,  255,   31,    9,  116,  792
2420 DATA  137,  186,  247,    2,  233,    4,  254,   60, 1123
2430 DATA   34,  116,  246,   60,  125,  116,    6,  232,  935
2440 DATA  111,  254,  170,  235,  223,   50,  192,  170, 1405
2450 DATA   86,  190,  142,    1,  184,   31,    9,  232,  875
2460 DATA  178,  253,   94,   60,  255,  116,  218,   10, 1184
2470 DATA  192,  117,    8,  198,    6,   81,    1,    1,  604
2480 DATA  233,   39,  255,  254,  200,  117,    8,  198, 1304
2490 DATA    6,   81,    1,    2,  233,   27,  255,  254,  859
2500 DATA  200,  117,    8,  198,    6,   81,    1,    4,  615
2510 DATA  233,   15,  255,  254,  200,   60,    9,  119, 1145
2520 DATA   32,    4,   59,  138,   38,   81,    1,  128,  481
2530 DATA  252,    1,  117,    2,    4,   25,  128,  252,  781
2540 DATA    2,  117,    2,    4,   35,  128,  252,    4,  544
2550 DATA  117,    2,    4,   45,  180,  254,  233,   14,  849
2560 DATA  255,  128,   62,   81,    1,    4,  117,    3,  651
2570 DATA  233,   27,  255,   44,   10,  117,    5,  176,  867
2580 DATA   27,  233,    6,  255,  254,  200,  117,   25, 1117
2590 DATA  128,   62,   81,    1,    0,  116,   13,  128,  529
2600 DATA   62,   81,    1,    1,  117,  226,  184,   15,  687
2610 DATA  254,  233,  227,  254,  176,    9,  233,  233, 1619
2620 DATA  254,  254,  200,   50,  228,  191,   74,    2, 1253
2630 DATA  209,  224,    3,  248,  138,   54,   81,    1,  958
2640 DATA  128,  254,    2,  117,    1,   71,  138,   21,  732
2650 DATA   10,  210,  116,  188,  134,  194,  128,  250, 1230
2660 DATA    2,  116,  219,  119,    5,  128,  254,    2,  845
2670 DATA  117,  212,  180,  254,  233,  176,  254,   83, 1509
2680 DATA   81,   82,  180,   66,   50,  192,  139,   30,  820
2690 DATA   71,    1,   51,  201,  139,   22,   73,    1,  559
2700 DATA  205,   33,  114,   30,  180,   63,  139,   30,  794
2710 DATA   71,    1,  185,  160,   15,  190,   95,    9,  726
2720 DATA  139,  214,  131,   62,   73,    1,    0,  117,  737
2730 DATA    5,  198,    4,   32,   73,   66,  205,   33,  616
2740 DATA  115,    6,  186,  167,    2,  233,    3,  253,  965
2750 DATA    1,    6,   73,    1,   43,  214,    3,  194,  535
2760 DATA  163,   75,    1,   90,   89,   91,  195,   87,  791
2770 DATA  191,   31,    9,   87,  232,   77,  253,  115,  995
2780 DATA   15,  138,    4,   60,   13,  116,    9,  232,  587
2790 DATA   87,  253,  170,  232,    9,    0,  235,  236, 1222
2800 DATA   50,  192,  170,   88,   95,  195,    0,   80,  870
2810 DATA   70,  139,  198,   45,   95,    9,   59,    6,  621
2820 DATA   75,    1,   88,  114,   13,  232,  135,  255,  913
2830 DATA   11,  192,  117,    6,  186,   36,    3,  233,  784
2840 DATA  185,  252,  138,    4,   60,   13,  117,   17,  786
2850 DATA  198,    6,  222,    8,    0,  255,    6,   82,  777
2860 DATA    1,  128,   62,  222,    8,    0,  117,  207,  745
2870 DATA  195,   60,   59,  117,  244,  254,    6,  222, 1157
2880 DATA    8,  235,  196,  136,    7,   67,  195,    0,  844
```

mand. By using these commands together, it is possible to solicit information to complete a command sequence.

The INPUT command accepts input from the keyboard and appends it to the current command string. The input is buffered, and the backspace key can be used to correct the entry. Up to 78 characters may be entered, and input terminates when the Enter key is pressed. The keys are put in the command string as they were typed, without the terminating <ENTER>.

The TYPE command copies the keys in the strings argument to the command string. Special keys (i.e., function keys and shiftkey combinations) are stored with a special code to indicate that they are extended ASCII. A special case of the TYPE command is the CR command. It is equivalent to the command

TYPE "{ENTER}"

and is included for convenience in closing commands after requesting an input.

The complete BDF file to implement the sample DOS menu is shown in Fig 3. Each of the commands is used to demonstrate its syntax. You can compile the file with MAKEBAR and produce a working DOS interface to load with SLASHBAR. By adapting this demonstration menu, you should be able to produce a menu for almost any application.

The MAKEBAR program

Simply put, the purpose of the MAKEBAR program is to translate Bar-menu Definition Files (.BDF) into .BAR files for the SLASHBAR program. MAKEBAR acts as an interface between the human menu writer and the SLASHBAR program, simplifying the tasks of both. MAKEBAR belongs to a family of programs that includes compilers, assemblers, and interpreters, and is itself a tokenising compiler. But before I explain exactly what that means, let's examine some basic definitions.

Interpreters

An interpreter is a program that treats source code (human-readable text) as data to be processed. The Basic program that comes on your PC-DOS diskette is probably the most familiar example of an interpreter. When you run a Basic-language program, the BASIC.COM program sits between you and the computer, executing your instructions. You tell Basic what you want it to do, and Basic tells the PC what to do to accomplish it. Thus, the term 'interpreter' is very appropriate.

The operation of an interpreter is not dependent on what has occurred previously or what will happen in the fu-

THE IMPORTERS OF MACE $195, XTREE $112, AND FORMTOOL $295

introduce

DS BACKUP+™

DSBACKUP+ is an invaluable hard disk software utility designed to quickly backup and restore any or all files from an IBM PC/XT/AT or close compatible

FEATURES

NOT COPY PROTECTED
This means you can install it and forget it, with no need for clumsy key disks.

TRUE DATA COMPRESSION
Now you can get even more data on each disk or cartridge — up to 40% more!

SPEED
No more waiting around — DSBACKUP+ backs up to 10 Megabytes in 5 minutes with its new SPEEBACK OPTION!

MULTIPLE VOLUMES
You can now backup and restore from more than one drive at a time,

DIRECTORY & FILE SCROLLING
Now you can scroll through all the selected backup files prior to the backup process and take full advantage of the Inclusion/Exclusion FILESPEC capabilities.

PERCENTAGE COMPLETION
DSBACKUP+ is always updating your screen with information regarding the status of your backup.

BENEFITS

DS BACKUP+ IS SAFE
All the data you spent years accumulating is automatically verified while backing up and/or restoring, assuring you complete data integrity.

DS BACKUP+ IS FAST
An entire 10 Megabyte hard disk can be backed up in 5 minutes **(That's 10 times faster than DOS).** Under normal operating procedures you will save valuable hours every time you back up.

DSBACKUP IS EASY
Completely menu or command line driven, all of the programming functions are clear and simple to follow during step by step backup/restore procedures. All the information you need is always on screen including single keystroke context sensitive help.

DSBACKUP+ IS POWERFUL
With DSBACKUP+'s new power features such as True Data Compression and Data Specific Backups, DSBACKUP+ offers options that were formerly only available on more expensive tape drives and mainframe systems.

INSURANCE YOU SHOULD NOT BE WITHOUT!

ONLY $195

PERFECT INTERFACE (AUSTRALIA) PTY. LTD.
Level 8, 56 Berry St., N. Sydney NSW 2060 Phone (02) 957 6686

Please send me ______________ copies of MACE, $195 each.

Please send me ______________ copies of XTREE, $112 each.

Please send me __________ copies of FORMTOOL, $295 each.

Please send me __________ copies of DSBACKUP+, $195 each.

I enclose my cheque for $______________ or please debit my American Express, Diner's Club, Visa, Mastercard or Bankcard plus $6.50 freight.

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Card expires ______________________ Signature ____________

Name ______________________ Phone No. ____________

Address ____

Company ____

ture. Each action is determined only by the current line of source code. The effect is one of executing each source code statement immediately, in much the same fashion as you would if you traced the source code by hand.

The reputation interpreters have for executing slowly is an unavoidable result of their method of operation. For example, if a program contains the statement A=B+C inside a loop, each iteration of the loop causes the interpreter to read and execute that statement as if it had come upon it for the first time. Each time the loop is executed, the line is read by the interpreter. First, the address of the variable A is found in memory by consulting a reference table. Next, the = is read and understood to mean that the result on the right should be stored in the variable A, and so on. The interpreter has to perform this procedure each time this statement is encountered. The result is a smart program doing things in a dumb way. The fact that it works fast enough to be useful is partly due to the power of computers.

The advantages of an interpreter, however, can easily outweigh the disadvantages. Since the source code itself is executed, programming changes can be made and tested rapidly. I often use Basic to 'rough out' code modules to ensure that the theory is sound. Interpreters usually have an interactive mode as well, in which normal program flow can be interrupted and variables can be examined or changed without the executing program's knowledge.

Compilers

The term 'compiler' describes a program that translates source code into a machine-readable form, instead of executing it. Compilers are usually associated with well-known programming languages, such as Basic or Pascal, but are also available for such applications as dBASE. Using a compiler allows you to work efficiently with symbols and expressions with which humans are more familiar and fluent while providing the ability to generate native code, or 'machine language', which is efficient for the computer to execute.

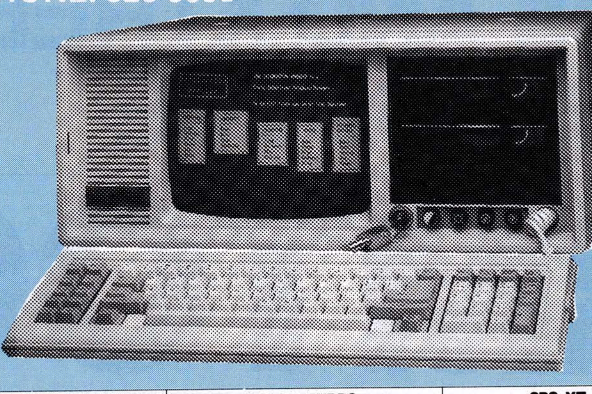
While an interpreter must read a program each time it is executed, a compiler reads and interprets the source code only once. When a statement like A=B+C is encountered, the actual address of the variables, along with the machine code instructions to add the quantities and store the result, are written to the output file. No matter how many times the statement is executed by the program, it will never have to be translated again. When the translation is complete, the compiler is no longer needed, and the resultant standalone code, after linking, can be executed directly by the operating sys-

```
 Sample BDF file for some DOS commands
PROGRAM "DOS"

MENU MAIN
        OPTION  FILE,"FILE HANDLING FUNCTIONS"
                EXECUTE FILE
        OPTION  DISK,"DISK HANDLING FUNCTIONS"
                EXECUTE DISK
        OPTION  SYSTEM,"SYSTEM MAINTENNANCE"
                EXECUTE SYSTEM
        OPTION  CLS,"CLEAR THE SCREEN"
                TYPE "CLS{ENTER}"
MEND

MENU FILE
        OPTION  COPY,"COPY FILE(S)"
                TYPE "COPY "
                ASK "ENTER SOURCE FILE(S)"
                INPUT
                TYPE " "
                ASK "COPY TO"
                INPUT
                CR
        OPTION  DIR,"DIRECTORY OF FILES"
                TYPE "DIR "
                ASK "WHAT DIRECTORY (ENTER = CURRENT)"
                INPUT
                CR
        OPTION  ERASE,"ERASE FILE(S)"
                TYPE "ERASE "
                ASK "ERASE WHAT FILE(S)"
                INPUT
                CR
        OPTION  RENAME,"RENAME FILE(S)"
                TYPE "REN "
                ASK "ENTER OLD FILE NAME"
                INPUT
                TYPE " "
                ASK "ENTER NEW FILE NAME"
                INPUT
                CR
        OPTION  TYPE,"DISPLAY FILE(S)"
                TYPE "TYPE "
                ASK "DISPLAY WHAT FILE(S)"
                INPUT
                CR
MEND

MENU    SYSTEM
        OPTION  DATE,"SET SYSTEM DATE"
                TYPE "DATE "
                ASK "ENTER DATE AS MM:DD:YY"
                INPUT         CR
        OPTION  TIME,"SET SYSTEM TIME"
                TYPE "TIME "
                ASK "ENTER TIME AS HH:MM:SS"
                INPUT
                CR
        OPTION  PROMPT,"SET SYSTEM PROMPT"
                TYPE "PROMPT "
                ASK "ENTER NEW PROMPT"
                INPUT
                CR
        OPTION  VER,"SHOW DOS VERSION"
                TYPE "VER{ENTER}"
MEND

MENU DISK
        OPTION  ASSIGN,"CHANGE DRIVE ASSIGNMENT"
                TYPE "ASSIGN "
                ASK "WHAT DRIVE LETTER IS REFERENCED"
                INPUT
                TYPE "="
                ASK "WHAT DRIVE SHOULD BE SUBSTITUTED"
                INPUT
                CR
        OPTION  CHDIR,"CHANGE DIRECTORIES"
                TYPE "CD "
                EXECUTE CHDIR
        OPTION  FORMAT,"FORMAT A DISK"
                TYPE "FORMAT "
                ASK "ENTER DRIVE LETTER"
                INPUT
                TYPE ":{ENTER}"
        OPTION  LABEL,"LABEL A DISK"
                TYPE "LABEL "
                ASK "ENTER DRIVE LETTER TO LABEL"
                INPUT
                CR
                ASK "ENTER NEW LABEL"
                INPUT
                CR
        OPTION  MKDIR,"CREATE A SUBDIRECTORY"
                TYPE "MD "
                ASK "ENTER NAME OF SUBDIRECTORY TO CREATE"
                INPUT
                CR
        OPTION  RMDIR,"REMOVE A SUBDIRECTORY"
                TYPE "RD "
                ASK "ENTER NAME OF SUBDIRECTORY TO REMOVE"
                INPUT
                CR
        OPTION  VOL,"DISPLAY DISK VOLUME LABEL"
                TYPE "VOL "
                ASK "SHOW VOLUME NAME OF WHAT DRIVE LETTER"
                INPUT          TYPE ":{ENTER}"
MEND

MENU    CHDIR
        OPTION  PARENT,"CHANGE TO PARENT DIRECTORY"
                TYPE "..{ENTER}"
        OPTION  ROOT,"CHANGE TO ROOT DIRECTORY"
                TYPE "\{ENTER}"
        OPTION  OTHER,"SPECIFY SUBDIRECTORY"
                ASK "ENTER SUBDIRECTORY"
                INPUT
                CR
MEND
END
```

Fig 3 A sample .BDF file for some DOS commands

CARTEL PERSONAL COMPUTERS

823 GLENHUNTLY ROAD,
CAULFIELD SOUTH, VIC. 3162
PHONE: 523 0006



CPC Portable

This is truly an innovative portable PC with many outstanding features.

Like the Desktop range, the CPC PORTABLE is available as the AT TURBO and XT TURBO.

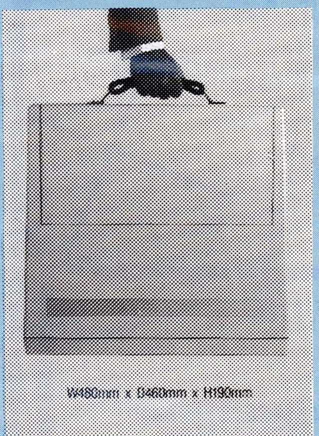
The PORTABLE AT TURBO houses a 10MHz 80286 CPU with an optional 80287 co-processor.

Similarly, the PORTABLE XT TURBO runs at an incredible clock speed of 10MHz with an 8088-1 CPU. An optional 8087-2 co processor enhances numeric computation. A NEC V20 IC further enhances processing speed.

The CPC PORTABLE range comes with a built-in 9 inch Dual Frequency high resolution monitor and a 84 Key PC AT/XT compatible keyboard.

Secondary storage is virtually unlimited as it can support up to two Floppy Drives and one hard disk.

PORT. XT	**$1890**
WITH 20 MEG HDD	**$2680**
PORT. AT (INCL. HDD)	**$3470**



	CPC AT TURBO	CPC XT TURBO
Main Board	16-24 Bit Microprocessor 80286 (10 MHz) CPU with Socket for optional, 80287 Co-Processor Expandable to 1MB Memory on board 8 Expansion I/0 Slots (6AT & 2XT slots) 32K ROM BIOS, Expandable to 64K	High speed 8088-1 16 Bit Micro-processor 8087-2 co-processor (optional) 10/4.77 MHz dual speed selectable 640K byte RAM on board 8K ROM BIOS, Expandable to 40K 4 LAYER BOARD 8 I/O PC Compatible Interface Slots
Colour Graphic Card	RGB Direct Drive and Composite Video 15.750 KHz Horizontal Scan Rate Display 25 Rows by either 40 or 80 Characters with 5 × 7 Character Matrix Graphic Mode: 640 × 200 Addressable Dots	
Monochrome Graphic Card (Optional)	TTL Positive Video Output Display 25 Rows by 80 Character Text with 9 × 14 Character Matrix 64 KB Screen Memory for Graphics and Text Graphic Model: 720 × 348 Addressable Dots Support Graphic Software eg: Lotus graph, Frame work graph, AutoCAD, Paint Brush Build in Parallel Port	
Serial Parallel Adaptor	RS232 Port (9 Pin OUTPUT) IBM PC Parallel Standard	On Multi I/O Card
FDD/HDD Adaptor	Supports 2 Floppy Drives (1.2MB & 360KB) and 2 Winchester Disks	
Floppy Disk Drive and Hard Disk	One 1.2MB One 20MB Hard Disk	Two 360K Byte Ivory Colour Teac Drives 20M Hard Disk (Optional)
Key Board	84 Keys PC XT/AT Compatible with "Click" Feel Enlarged RETURN and SHIFT Keys	
Multi-I/O Card (Optional)		Real time clock/calendar Serial Ports which can be configured for COM1 & COM2 Centronics Parallel Printer Port operates as Lpt 1 & 2 Game Paddle Joystick Interface Utility diskette for real time clock setting and RAM DISK configuration
Power Supply	Input: AC 90-130V/180-260V. 50 to 60Hz Power Output: 200W, Support 2 — XT Desktop 150W Floppy Drives and 2 Hard Disks	

CPC Desk Top

CPC/XT/TURBO 4L./10MHz.	**$1250**
CPC/AT/TURBO 10MHz.	**$2790**

ALSO AVAILABLE

CPC/XT/Turbo 8MHz	**$1180**
CPC/XT/4.77MHz.	**$1090**

DISKETTES

XIDEX

5¼" SS/DD $27.80/BOX
5¼" DS/DD $35.00/BOX
5¼" HD-AT $68.00/BOX
3½" SS/DD $50.70/BOX
3½" DS/DD $57.00/BOX
*NASHUA 5¼" DS/DD $30.00/BOX
*PRECISSION 5¼" DS/DD $20.00 PER 10

MONITORS

THOMSON TTL	**$260**
SAMSUNG TTL	**$220**
DTX 14" COLOR	**$595**
THOMSON COMPOSITE	**$240**
TAXAN COLOR SUPER VISION III	**$790**

PRINTERS

EPSON LX-86 + TRACTOR	**$460**
BROTHER M1509 180 CPS	**$850**
STAR SD15 160 CPS	**$750**
STAR NX-10 120 CPS	**$490**
STAR NX-15	**CALL**
STAR NB-15	**CALL**

MODEMS

SENDATA

V21 300 BPS FD. MANUAL	**$195**
V21AA 300 BPS FD. AUTO ANS.	**$280**
VIDEOTEX 75/1200, 300 FD.	**$250**
2000B 75/1200 VIDEOTEX, 300 FD. 1200 HD. AUTO ANS.	**$490**
V22 1200 BPS FD. AUTO ANS.	**$590**
V22 AD 1200 BPS FD., HAYES AUTO DIAL AUTO ANS./DISC.	**$790**
321AA 1200 FD. 300 FD. 75/1200 VIDEOTEX AUTO ANS./DISC.	**$840**
X10CON 1200 FD, 300 FD, 75/1200 VIDEOTEX, HAYES AUTO DIAL AUTO ANS./DISCONNECT	**$980**

PULSAR

SAM 1200, 300 FD. 75/1200 AUTO DIAL, ANS, DISC.	**$790**

INTERFACE FOR IBM AND COMPATIBLES

5 MEG HARD DRIVE & CONT.	**$395**
10 MEG HARD DRIVE & CONT.	**$595**
20 MEG HARD DRIVE & CONT.	**$790**
HARD DRIVE CONTROLLER CARD	**$195**
LINK TERMINAL	**$660**
HERCULES COLOR CARD	**$295**
PERSYST COLORGRAPHICS CARD	**$168**
PERSYST MONO CARD	**$168**
STB SHAUFFER CARD	**$287**
* APPLE TYPE JOYSTICK	**$25**
* IBM TYPE JOYSTICK	**$35**
* 360K-'TEC' FLOPPY D/DRIVE	**$120**

4164 DRAM **$2**	41256 Dram **$4.50**
8087 PROCESSOR	**$260**
80287 PROCESSOR	**$490**

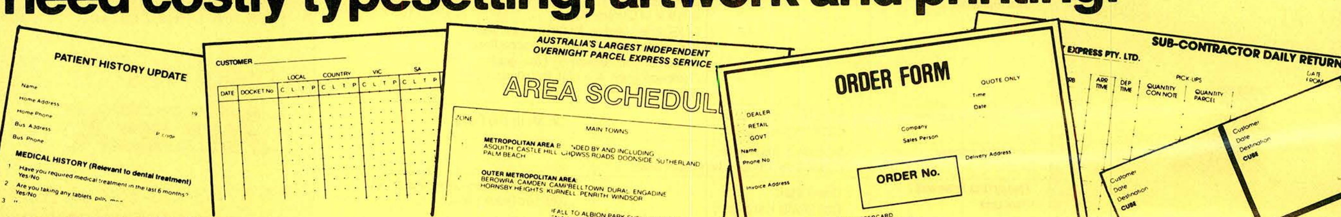
'*IBM IS A REGISTERED TRADEMARK OF INTERNATIONAL BUSINESS MACHINES

ALL PRICES INCLUDE SALES TAX

THE IMPORTERS OF MACE $195 AND XTREE $112 INTRODUCE

FORMTOOL

FORMTOOL is the sophisticated software package that allows you to custom make forms, letterheads — all office stationery. With FORMTOOL you no longer need costly typesetting, artwork and printing.



LINE DRAW
Single keystrokes make screen-wide horizontal and vertical lines with perfect intersections, corners, T's, double lines and grids automatically.

MERGE
Fill in form or just specify dBase, DIF or ASCII data files and let FORMTOOL merge data into your new form.

PRINTING
Print your own office forms. Just plug in for use with most dot matrix, laser and injet printers. Sideways printing included.

TEXT COMMANDS
Variable fonts, typestyles and sizes. Direct access to graphic symbols, horizontal and vertical typesetting. Foreign characters etc. etc.

ONLY
$295
A GENUINE PRODUCTIVITY TOOL

PERFECT INTERFACE (AUSTRALIA) PTY. LTD.
Level 8, 56 Berry St., N. Sydney NSW 2060
Phone (02) 957 6686

Please send me ______________ copies of MACE, $195 each.

Please send me ______________ copies of XTREE, $112 each.

Please send me __________ copies of FORMTOOL, $295 each.

I enclose my cheque for $__________ or please debit my American Express, Diner's Club, Visa, Mastercard or Bankcard plus $6.50 freight.

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Card expires ______________________ Signature ________

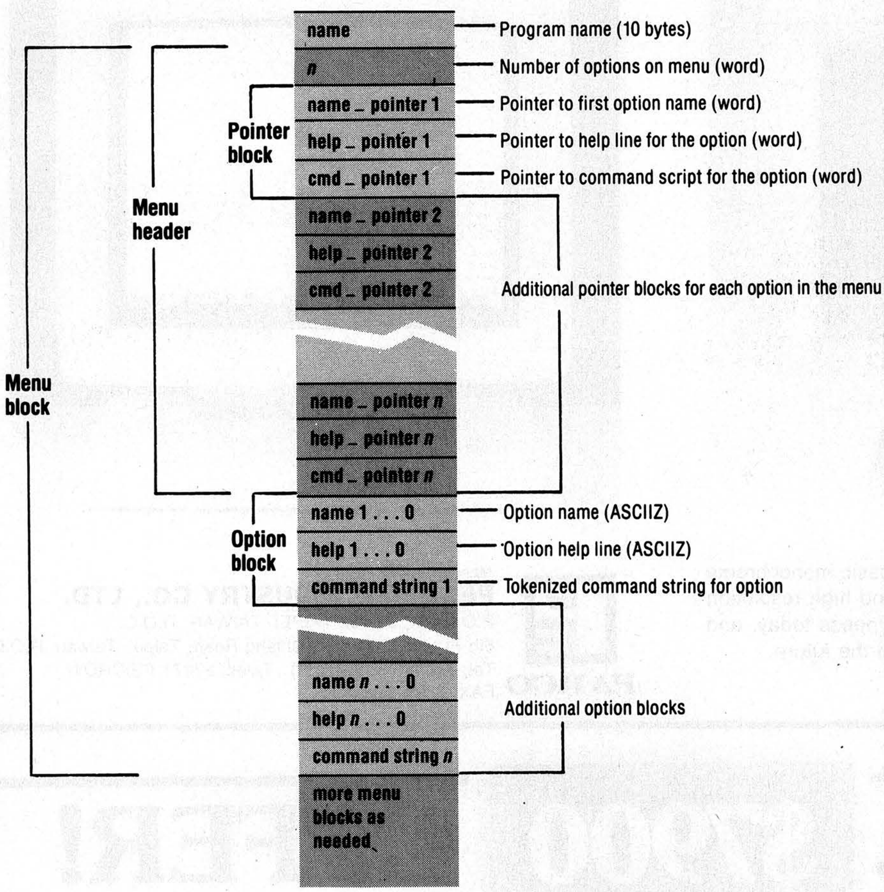
Name ______________________ Company ________

Address ______________________________

Phone No. ______________________________

Buy Now! Save time & printing costs

.BAR file schematic



ASCIIZ strings may be any length and are terminated with a 0 byte.

Tokenized command strings end when an EXECUTE or SEND token is read.

tem. (I'm considering the linking process to be part of the compiling process for the sake of this discussion).

A program that has been compiled is usually more efficient and faster-running than the same program running under an interpreter. The price of this efficiency is inflexibility. To change the operation of the program, the source code must be edited and recompiled. If the program is large and complex, the time involved for compiling may not be trivial. Thus, many programmers like to combine methods, using an interpreter for development and compiling the final product to increase speed.

Tokenisers

Tokenising is a form of computer shorthand that compresses source code by representing frequently used instructions and phrases as unique numerical values known as tokens. Tokenised source code occupies considerably less space than the original source code and may be produced as the code is read the first time. Unlike compiled code, tokenised code does not consist of machine language instructions, and it is not executed directly by the computer. The format of the tokenised file is hardware independent. Tokenised code is simply source code in a compressed form. A Basic program, saved without the ',A' parameter, is an example of tokenised file. In the Basic interpreter, the tokeniser is an integral part of the interpreter.

Tokenised format

SLASHBAR requires input files that are constructed in a specific format. MAKERBAR provides this format by combining some of the characteristics of a compiler with the ability of a tokeniser to compress source files. In the accompanying diagram, '.BAR file schematic,' the file starts with a ten-character name that will be displayed by the SLASHBAR utility in its window. The remainder of the file is constructed of many modules. Each module begins with a header block. The header begins with a word (2 bytes) that indicates the number of options in the menu block. Immediately following is a block of pointers. Each option in the menu block causes three pointers to be reserved in the output file. The first points to the option name, which is stored as an ASCIIZ string (i.e., is terminated by a zero byte). The second

'MAKEBAR combines some characteristics of a compiler with the ability of a tokenizer to compress source files.'

points to the help text provided for the option. This is also stored in ASCIIZ form. The third points to the address of the first command to be executed when this option is chosen. The pointer values are always the relative offsets of the items from the beginning of the .BAR file.

The commands for an option are stored in interpreter format, where any data required to perform a function is stored immediately following the function request. Instructions and datas are stored sequentially in a single file, and program flow is continuously forward. (The only exception is the EXECUTE instruction, which repositions the instruction pointer. Program flow then proceeds forward again).

Understand MAKEBAR

The assembly language listing for MAKEBAR is well commented, and is an example of top-down design. To keep the .COM files as small as possible, I wrote MAKEBAR in assembly language. If size had not been a concern, however, I would have preferred to use the C language. As a result, programmers may notice a distinct C 'flavour' in the procedure names and operation of the compiler.

File handling

The first order of business is performed by the OPEN_FILES procedure, which calls the OPEN_A_FILE procedure twice, once each for the input and output filenames. An attempt is made to open the input file, but if it doesn't exist, an error message is displayed and the program terminates. The output file is opened with the Create File function call. This call will create the file if it doesn't exist, or truncate an existing file with the same name. The DOS file handle functions are used to open and manipulate the files, and so a full pathname may be specified.

When DOS loads a program, it formats an area in the Program Segment Prefix (PSP) to contain the characters that followed the program name on the command line. The PSP is located in the first 100h bytes of the Data Segment (DS register), and the characters are located at PSP:81h. The byte at PSP:81h contains the number of characters in the command line minus the trailing ENTER. The OPEN_A _FILE procedure scans this command line using the NON_WHITE procedure to skip any leading blanks, tabs, or other 'whitespace' characters. Scanning ends when a nonwhite or a carriage return character is found. Assuming a name is found, WHITE is called to point past the end of the string, the file name is then copied to PATH_BUF, and a 0 byte is appended to create an ASCIIZ format.

After the input file has been opened, characters are read using the GET_CHAR procedure. The GET_CHAR routine performs buffered file input and detects and attempt to read past the end-of-file (EOF). The SI register is used to point to the current character in the buffer, and is preserved by any routine that uses it. SI can always be used to get the current character, but GET_CHAR must be used to move SI to the next. If a call to GET_CHAR causes the pointer to go past the end of the buffer, more characters are read from the source file. Comments are eliminated by GET_CHAR when the file is read. If a semicolon is encountered, all following characters are skipped until the next carriage return.

> *'Key combinations in a BDF file that are not recognised by the BIOS will produce an error message, as will redundant key combinations.'*

Tokenising

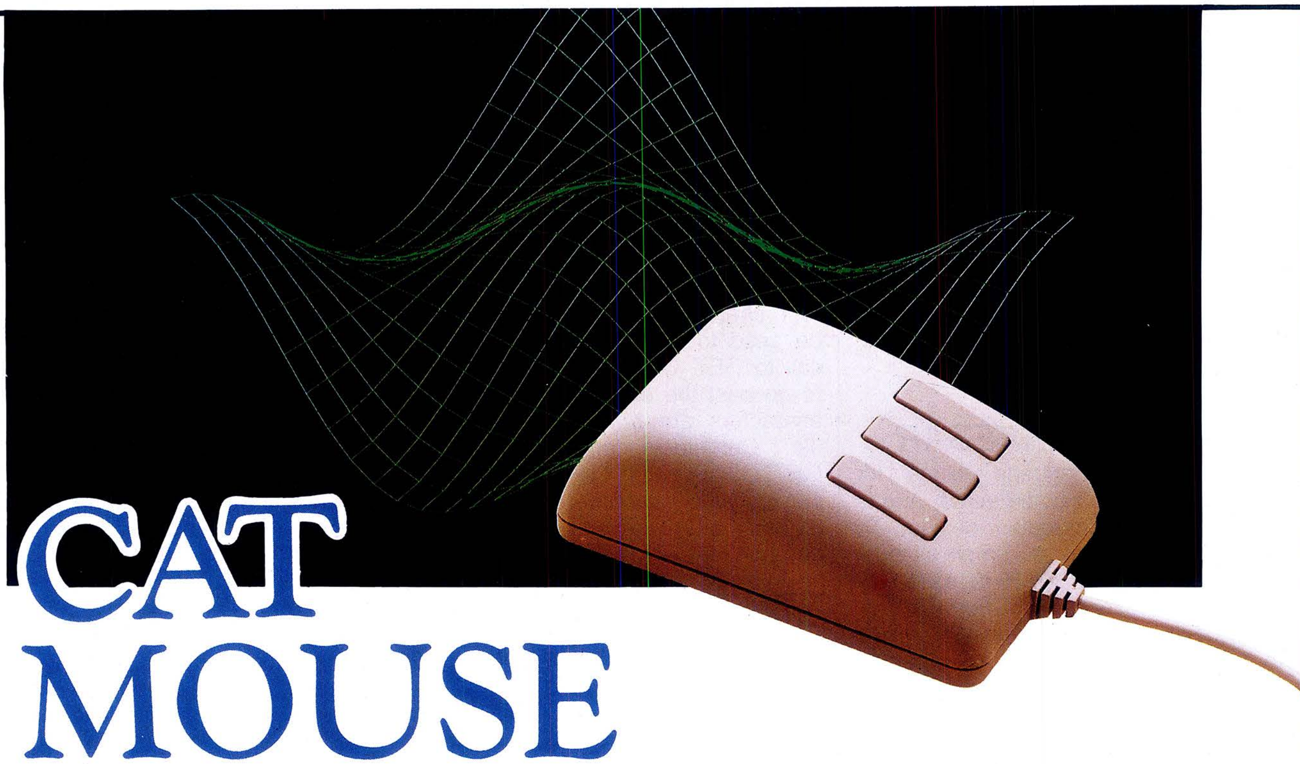
Once the files have been opened, control is passed to TOKENIZE. Two major operations occur in this procedure: the reduction of commands to tokens; and the resolution of intermenu references. Several counters and flags are used to keep track to the operation of the compiler, and these are initialised before processing begins.

In addition to WHITE and NON_WHITE, several procedures are used to facilitate the parsing (separating into translatable quantities) of the source file. NEXT_WORD skips to the first nonwhite character, on the same line, after the current word. NEXT_LINE is used to skip past a carriage return character and is the only function that will do so. MAKEZ takes the word at SI and copies it to a scratch buffer. A zero byte is added to the end to make it an ASCIIZ string. Use of these procedures allows the source file to be handled with ease and simplifies processing the menu.

Except for comments and blank lines, each line of the source file must begin with a command. Therefore, the first step in processing is to determine if the first word on each line is a valid command. This is accomplished by the procedure TABLE_LOOKUP, which takes two arguments. The first is a pointer to a list of strings in ASCIIZ format. In this case, CMD_TABLE will be used. The second argument is a pointer to the ASCIIZ string to look up. If the entry is found in the table, the sequence number of the matching entry is returned in AL. This number is the token for that command. A nonmatching entry returns AL = FFh and processing terminates with an error.

As mentioned previously, PROGRAM must be the first command encountered, and it must occur only once. This condition is checked as the source file is processed, and a violation will produce an error message. The PROGRAM command must be followed by a quoted string containing the name of the menu.

All quoted strings are processed by the TKN_STRING procedure. Since control is passed on the assumption that a quoted string follows, SI must point to a quote (") on entry, or an error is reported. Skipping past the opening quote, characters are read from the string and their ASCII values are placed in the output buffer. Special character names, surrounded by braces, are not output directly but are interpreted and translated.



MS-810 CAT MOUSE

* For PC/XT & PC/AT Compatible
* Optical rotary encoder
* 3 Tactile switch buttons
* Max tracking speed 200mm/sec
* Standard RS-232C output
* Silicon rubber coated ball

MCK-101 101 Keys
for PC RT/AT/XT Compatible
MCK-860 84 Keys
for PC AT/XT Compatible

Comm Features:

* Sharp click Fieel and Tactile Feedback
* High-reliability merchanical keyswitch
* Multi language available

OEMAX can offer not only finished products, but also CKD form and OEM projects.

OEMMAX®

OEMMAX COMPUTER SUPPLIES CO., LTD.
SUITE 204, NO. 1, LANE 8, SEC. 1, CHUNG SHAN N. ROAD, TAIPEI, TAIWAN, RO.C.
P.O. BOX 8-156 TAIPEI, TAIWAN, R.O.C.
TELEX: 14261 OEMMAX TEL: 381-0695, 381-9439
FAX: 886-2-3813175 CABLE ADDRESS: "OEMMAX" TAIPEI

Special characters

When a left brace is encountered inside a string, control is passed to the routine SPEC_CHAR. The name of the character is removed from the braces and compared to entries in KEY_NAME_TBL by the TABLE_LOOKUP procedure. If a valid token is not returned, an error is displayed. The three special keys {S}, {C}, and {A} are used to turn on Shift, Control, and Alt, respectively, for the next character. These tokens are used internally and are not written to the ouput buffer.

Some special keys, like Enter and Esc, produce ASCII codes. These codes are written directly to the output buffer. Other keys, however, such as the functional keys F1 through F10, produce what are termed 'extended ASCII' codes. When SLASHBAR is reconstructing the keystrokes, it needs to know when a key value is extended ASCII. To indicate this, a byte with the value FEh is put into the buffer ahead of each extended ASCII value. When SLASHBAR reads the string it will ignore the FEh and output the next byte as extended ASCII. When the closing quote is read, the string is terminated by writing a zero byte to the output file.

Once the PROGRAM command has been processed, MAKEBAR is ready to process menu blocks. Each menu block is treated as a unit and processed independently of the others. Nesting menus, by starting a new menu without closing the first one, or forgetting to terminate a menu block with a MEND command will produce an error message.

The pointer problem

In the output file, each menu consists of a header block of pointers followed by the body of the block. Until the options are read and counted, the size of the header cannot be known. Paradoxically, however, in order for the options to be stored in the proper output buffer location (offset by the size of the header) as they are read, the header size must be known!

A two-pass compiler solves this problem by rereading the file and using the information gathered on the first pass to resolve the offsets. MAKEBAR, however, is designed to read through the source file only once, ie, to be a single-pass compiler. By using a second internal buffer, however, it is possible to circumvent the apparent logical impossibility. When a MENU command is parsed, a word is reserved in the output buffer to count the number of options in that menu. At the same time, a temporary buffer is initialised to hold the name, help line, and tokenised command string for each option as it is processed.

When an OPTION command is read, the option counter is incremented. The option name is then parsed and stored in the temporary buffer (pointed to by the BX register), while a pointer to contain the offset of the menu name relative to the beginning of the temporary buffer is created in the output buffer. But instead, the offset of the name from the beginning of the *temporary* buffer is placed in the pointer entry in the output file. For the first entry in the temporary buffer, this value would be 0. (Reread this paragraph until you understand it, as it's crucial to the algorithm).

The process is then repeated for the help line. The offset from the start of the temporary buffer is written to the second pointer entry for that option in the output file. Finally, the commands for the option are read, tokenised, and placed in the temporary buffer. A third pointer entry is created to point to the beginning of the command string. Thus, for each option in the menu three pointer entries are created in the output buffer, while the information is stored in the temporary buffer.

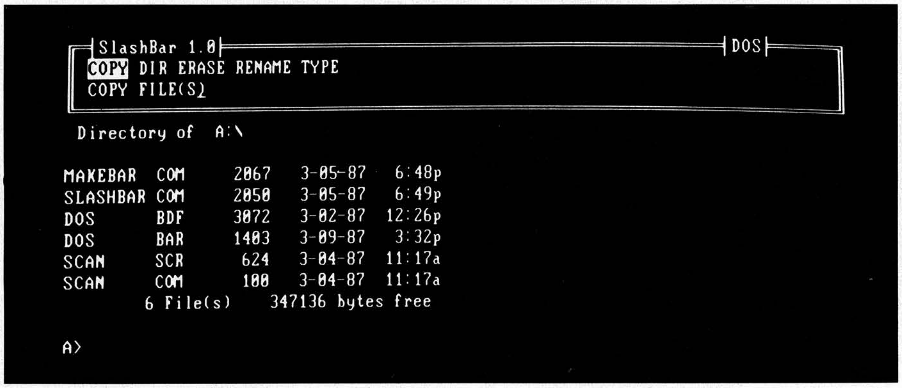
When a MEND command is processed, the fun begins. Because the options have been counted, the size of the header and the relative offset of the first byte after the header are now known. After the contents of the temporary buffer are appended to the output buffer immediately following the header, the pointer values in the header, originally relative to the start of the temporary buffer, now have the relative offset of the byte after the header added to them. This converts the pointer values to relative offsets from the beginning of the output buffer. The process is actually simpler than it sounds.

Inside the option block

Inside each option block, the commands are read, tokenised, and placed in the output buffer. Since INPUT and CR take no arguments, the token is enough information for SLASHBAR to perform the command. TYPE and ASK both take quoted strings as arguments. The processed strings are stored in ASCIIZ form immediately following the token. The final command, EXECUTE, is followed by a pointer to the start of the menu that is to be invoked. The option block is closed when either another OPTION or a MEND command is read, and the SEND token is written to the output buffer.

The EXECUTE command takes as an argument the name of the menu to which control is to be transferred. In the output buffer, this becomes an EXECUTE token followed by the offset of the referenced menu from the start of the output buffer — or, more simply put, a goto. Since the top level menu block must appear first in the source file, all EXECUTE commands are forward references and the offsets of the target menus are not known. This creates a problem for our one-pass compiler, for the same reason as was discussed in connection with the menu header, but it is solved in a slightly different fashion.

Menu names can appear in two places in the BDF format: as a name in a MENU command or as a target in an EXECUTE command. While a menu that is not the target of an EXECUTE command will not produce an error (consider the top-level menu), trying to execute a menu that does not exist, or executing it from more than one location, will produce an error. The SEARCH_MENU_TABLE procedure resolves all references to menu names.



A screen showing what you'll produce with next month's SLASHBAR program

When MAKEBAR begins to process a file, a table is created to hold all menu references. The format for an entry is an ASCIIZ string followed by two words. When a MENU command is processed, SEARCH_MENU_TABLE is called in the 'post' mode. This means that the offset of the menu is known and can be used to satisfy a reference. The name of the menu and the offset of the header in the output buffer are passed along the SEARCH_MENU_TABLE procedure. If no entry for that name exists, one is created by storing the name of the menu, a word containing the offset of the menu header in the output buffer, and FFFFh in the second word to signal that this entry is posting an address. If a post entry for that name already exists in MENU-NAME-TBL, an error is reported.

When an EXECUTE command is processed, SEARCH_MENU_TABLE is called in the 'request' mode, and is expected to return the address of the referenced menu. If a post entry is found in the table, the offset of the menu is returned and placed in the temporary buffer after the EXECUTE token. The second word of the entry is changed to FFFEh to indicate that the menu has been referenced. Referencing a menu more than once will produce an error.

Two other situations are possible. If SEARCH_MENU_TABLE is called to request an address and no entry exists in the table for the name, an 'IOU' is created by storing the name of the menu, the offset of the header of the menu that contains the request, and the offset of the requesting command from the end of the header. The absolute address cannot be supplied because the option block requesting it is still under construction. Then, a null reference is created in the temporary buffer where the menu address will be placed.

When a post call is made with the address of the referenced menu, an entry with that name will be found in the table. The second word will not be FFFFh or FFFEh, indicating that the entry contains an unfulfilled request. The address of the menu passed with the post call is stored directly into the output file, satisfying the forward reference. The first word following the name contains the offset of the menu header. The length of the header is calculated from the word at that location. Finally, the address containing the null reference to be replaced may be determined by adding the offset of the menu header, the length of the header, and the offset past the header of the null reference (stored in the second word of the table entry).

The END command indicates that processing of the input file is complete. After checking for any open blocks and bad references, the output buffer is written to the output file as one operation. The output file is then closed to update the time, date, and length data and the program is ended.

Conclusion

MAKEBAR and SLASHBAR are separate modules of what is a single programming system. SLASHBAR performs the interpretation and execution of the commands, while MAKEBAR tokenises and resolves address references as a compiler. The net result, combined with the design of suitable .BDF menu files for your applications, will let you give your programs the look and feel of 1-2-3. *(A final note: Not all programs handle keyboard input identically, and space precludes adding an 800-byte table to cover all possible codes. It is thus possible that some application commands may not be useable in this menu file — Ed.)*

END

Part 2 (SLASHBAR) will appear next month.

FCC Quality Keyboards

Agents & Distributors Wanted !!

Enhanced keyboard

KB-5161 (101 keys) FCC ID: E8H51KKB-5161

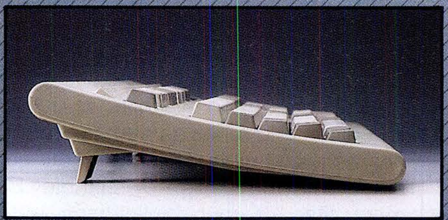
KB-5162 (102 keys)

KB-5160 AT (84 keys)

FCC ID: E8H5IKKB-5160 AT

KEYBOARD FEATURES OF
KB-5161 & KB-5162

- FCC Approved
- XT/AT, NEW XT, NEW AT Switch Selectable.
- Click Sound option.



- Double injection key caps
- Mechanical key switch

* IBM PC, XT, AT are registered trademarks of International Business Machines Corp.

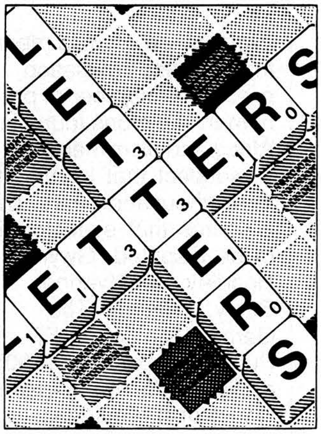
HEAD OFFICE & FACTORY

Chicony

CHICONY ELECTRONICS CO., LTD.

7 FL., NO. 35, KUANG FU S. RD.
TAIPEI 10552, TAIWAN, R.O.C.
TEL: (02)7647277

FAX: (02)761-7237
TELEX: 14465 CHICONY



This is your chance to air your views — send your letters or contact us via Microtex on Telecom's Viatel, page 666. The address to write to us is Australian Personal Computer, 2nd Floor, 215 Clarence Street, Sydney. 2000

Disparate tastes

I have just read the review of PC-Write for the IBM PC in the March 1987 issue of your magazine. This review seems to me to typify much of what is wrong with software reviewing in Australian PC magazines. Your reviewer devotes a paragraph to saying what makes a *good* word processor is an unanalysable matter of taste. This second paragraph states that PC-Write is not to his taste. This is probably true, but hardly interesting. I had no reason to believe that his taste coincides with mine, and by the end of the article, much reason to believe otherwise.

Apart from an extremely superficial description of the software, he makes only two other comments about the software. He claims that it is complex and user-hostile. Complexity is not necessarily a vice and even after using it for five months I would admit it is not particularly *user cuddly.* Some of us, however, are not impressed by excessive friendliness and are more concerned with functionality and value for money. On these criteria, PC-Write scores extremely highly, as is attested by other reviewers and users. No, I am not a hacker or even a programmer and yes, I do use other word processors.

The mention of value raises another issue. His dismissal of the shareware concept does little credit to Australians generally or to him in particular. It may well be that *some* Australians still believe in the free lunch. His stating that the price of the software is $31, however, is simply dishonest.

The shareware concept has made available much high quality, well supported software at very reasonable prices. Your reviewer's dismissal of it and encouragement of others to do so is not in the best interests of PC users anywhere.

I have paid for this and other shareware with entire satisfaction. I commend this concept and honesty generally, to Australian users. This relates also to some garbled mention of copyright elsewhere in the magazine (page 8). This material *is* copyright even if it is not copyright to PC-SIG. Australian copyright does cover software and international convention does extend that copyright protection to any country in which similar protection is extended. I am quite confident that this includes the USA — but check with your lawyers.

A final comment: Your reviewer comments on the expense of obtaining telephone support from the USA. A trans-Pacific call costs about $2 per minute. Given that the average trouble- shooting call may take 1-5 minutes and that many vastly more expensive packages come with no support at any price, this seems quite reasonable to me, especially now that I have moved to Darwin whence a call to anywhere costs a little less than $1 per minute during business hours. The USA is often awake and available in the *wee small hours* when I am most likely to need them. Australian suppliers are only available to me while I am at work, have other things to do and do not have access to *my* computer and software. I suspect that many users outside the Sydney-Canberra-Melbourne axis would agree. The software support from local suppliers varies from the poor ("I'd like to help but I don't understand . . .") to the non-existent. Telecommunication costs — even internationally — are trivial in comparison with the costs of software.

Robert Boot

At the time the PC-Write review went to press, the price was $31. It is now available for $18, but without the spelling checker — Ed.

XDIR patch

Regarding the program XDIR for the IBM PC in May *APC's* productivity column, there is a subtle fault in the "BDISK" procedure which can cause a system crash. (Try running FDISK or Norton Utilities NU.COM after XDIR is loaded.)

To rectify the fault define BDISK as a FAR procedure instead of a NEAR and replace the IRET instruction with RET 2. This will preserve the status of the flags returned by Int 13H whereas the IRET would overwrite the flags causing improper error signalling and consequent system malfunction.

Rod McLagan

XDIR, in .COM, .ASM and .BAS form, is now available on Microtex, page #6663 — Ed.*

BBS on the skids

I have just heard that Telecom is to escalate the costs of telecomputing to a point where the average BBS and user will not be able to afford to either operate a bulletin board or use such a board.

Telecom plans to time local calls, charge the host computer every time it's on line so either forcing higher membership fees or, if the members can't afford them, closing the BBS down.

Now the reason, so Telecom claims, behind such moves is that businesses are dialing up lines and holding them all day for the price of a local call, whereas they should be using a leased data line. This may be true, but I see it as an easy way out for Telecom to justify huge hikes in rates.

It's bad enough now having to pay the amounts that we do. Consider this: It costs $18 just to re-connect a phone if a subscription is cancelled. If your service breaks down after office hours or on weekends, you have to wait until office hours for your problem to be

rectified *(though when Telecom technicians do arrive, the odd roof repair will probably be thrown in gratis — Ed).*

So what is the answer? If they have to time local calls, can they do it during office hours? And what about exempting private BBS from any levies? Anyone want a modem?

M Taylor

Obituary

So it's finally over. It has taken 3 years to destroy the Macintosh concept, but the latest Apple computers (what a nerve they have to use the name Macintosh for them!) put the final nail in the coffin.

Suppose I list some of the main features that caused me to buy my Mac in 1984, like no noisy fan, no need to read the manual, no dependence of 'experts', little need to learn what goes on inside, small desk footprint, no more keys than necessary, nothing else to buy to (at least) wordprocess, an attractive carry-able package, and above all else, a relatively low price. All these are now gone!

Apple has deserted its personal customers. I have no quarrel with its wish to serve business, and the Mac II looks like a very nice mainframe. I work with mainframes every day, and loathe them. Like so many other original Mac buyers, I was devoted to Steve Jobs' concept. Now he is gone, and so is the Mac.

R.I.P. Macintosh!

E O Tuck

Palaeontologists take note

In the April 1987 issue of *APC,* Stephen Applebaum wrote "Mah Jongg, a game which originated in China some three million years ago, . . .". If Mr Applebaum has any evidence to support this claim, then he should communicate it immediately to the world's palaeontologists, as it would mean that Chinese civilisation predates a number of pre-human skeletons found in Africa and elsewhere.

I suspect that he meant three thousand years, but it seems that even this is to be disputed. Gwyn Headley and Yvonne Seely, in 'Know The Game, Mah-Jong' (EP Publishing Limited, 1980) make the following claim: "Most of the evidence, however, seems to point to the game *[Mah-Jong]* being developed in the Ningpo area of China in the 1870s . . .".

R Sharp

END

TOP DEAL COMPUTERS

NEC MULTISPEED!!

THE NEW STANDARD IN PORTABLE EXCELLENCE

- 4.77 MHz or at an incredible 9.54 MHz.
- Fastest portable computer on the market • Supertwisted LCD display
- In-built software • 640 Kb as standard
- Dual 3.5 720 Kb Floppy Disk drives integral with machine

APC IV Powermate!
The most power at the least cost.
Fully IBM Compatible.
Intel 80286 Processor running at 8 MHz.
640 Kb RAM.

Your choice of:
— Dual 1.2 Mb Floppy Disk drives.
— Single 1.2 Mb Floppy Disk & Internal 20 Mb Hard Disk.

NEC machines are extremely competitive and so are our prices!!
So contact us now for a quote on any of the wide range of NEC Computers, Printers & Peripherals.

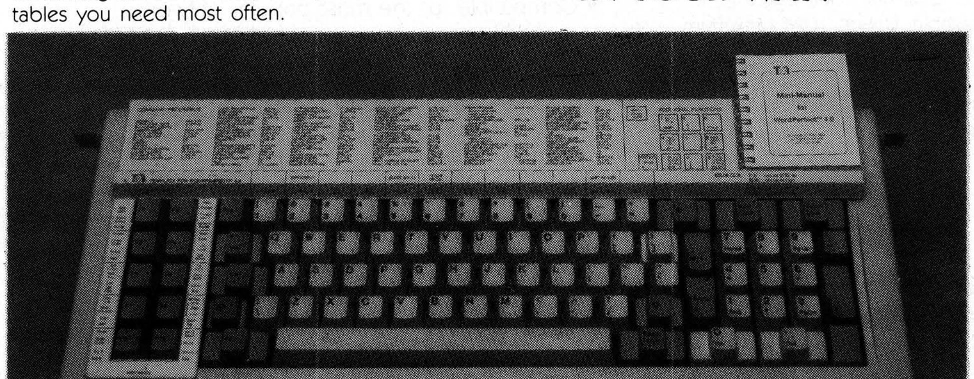
MELB:
600 0188
271 William St.

SYD:
221 559
189 Kent St.

The face of the template displays the type of information you want handy all the time, such as menu structures, key assignments or cursor control information.

The Mini-Manual is a specially condensed guide to your software, containing the references, examples and tables you need most often.

A TDA TEMPLATE PUTS INFORMATION WITHIN REACH WITHOUT PUTTING IT IN YOUR WAY!



STANDARD KEYBOARD TEMPLATE ILLUSTRATED.
ALSO AVAILABLE FOR ENHANCED KEYBOARD.

The 10 function keys are directly referenced by the "U" portion of the template. Colors are used to indicate if a key is to be used in conjunction with the Alt, Ctrl or Shift Key.

Templates Available for . . .
- DOS/Basic®
- Turbo Pascal™
- WordPerfect™ 4.1/4.2
- Lotus 1-2-3™ 1.1/2.0
- Symphony™
- WordStar®
- WordStar® 2000 V2
- MultiMate™ 3.3/3.6
- Microsoft® Word 3.0
- DBase III™ Plus
- DisplayWrites 3™/4
- Blank

. . . and more coming!

Each template is made of high-impact polystyrene especially molded to snugly fit IBM personal computer keyboards.

For further information please send this coupon direct to:

TDA MAIL COUPON
PCACCESSORIES P/L
P.O. BOX 374
N.S.W. 2074
Mr/Mrs/Ms ____________________
(Please print clearly)
Address ____________________
____________________ P/code __________
Sydney (02) 449 4721 Phone ______________ *(Optional)*

PCACCESSORIES PTY LTD

P.O. Box 374,
TURRAMURRA N.S.W. 2074
Telephone: (02) 449 4721

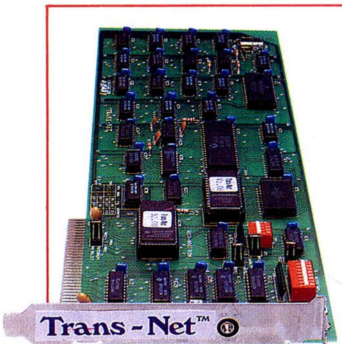
Booth No. HALL 7 D11 HANNOVER MESSE CeBIT '87 Mar. 4-11

ALL IN ONE

RPTI-NET™ (Trans-Net™) PC LAN Comes with NETBIOS Emulator, Novell NetWare Driver

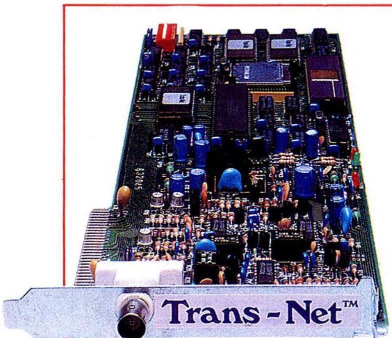
The most cost-effective way to run IBM LAN software and all other third-party LAN-based software.

- The Trans-Net NETBIOS Emulator allows you to run IBM PC Network Program right on your inexpensive Trans-Net hardware. And of course all other software designed to run on the IBM PC Network and IBM PC Token-Ring Network without making any changes at all on network installation.
- With high-performance Trans-Net's Novell Advanced NetWare Driver, you are able to choose and run multi-user application packages from the rich library of Novell NetWare-based software on Trans-Net hardware.



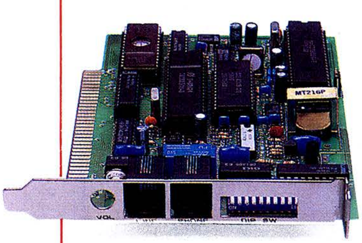
Specifications:
- Topology: Distributed Bus
- Data Rate: 1 Mega Bits/Sec
- Distance: 1.2KM Maximum
- Cabling: RS-422 Twisted Pair Wire
- Addressable Users: 255 Maximum
- Computer Interface: IBM PC/XT/AT and Compatibles
- Operating Systems: PC-DOS: 2.x, 3.x MS-DOS: 2.x, 3.x

Features:
- ☐ Disk Sharing
- ☐ Printer/Plotter Sharing
- ☐ Transparent to DOS
- ☐ Trans-Net Spool (Printer File Spooling)
- ☐ Trans-Net Mail (Electronic Mail Software)
- ☐ Classroom Monitor
- ☐ Disk (Boot) Server



Specifications (Ethernet-based):
- Topology: Distributed Bus
- Data Rate: 10 Mega Bits/Sec
- Cabling: RG-58/U Thin Cable or Ethernet Thick Cable
- Addressable Users: 1024 Maximum
- Computer Interface: IBM PC/XT/AT and Compatibles
- Distance: 2.5 KM Maximum
- Operating Systems: PC-DOS 3.x MS-DOS 3.x

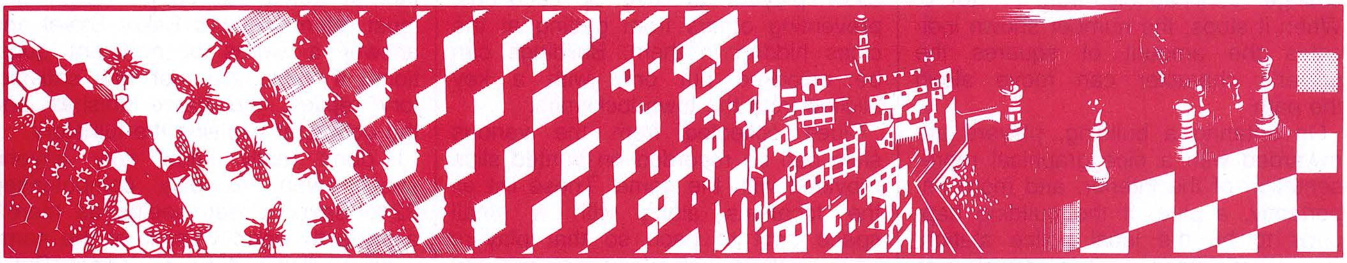
- Suitable for both the Ethernet and Cheapernet configurations, in which external and built-in transceivers are provided respectively.
- Through the INT 5CH entry, it is NETBIOS interface compatible, and operating system independent.
- Compatible for the most popular network operating systems; such as PC-NET, MS-NET, and NetWare/PCN network program.
- The structure of ISO protocol layer is followed. The lower 5 layers, i.e. the physical layer, data link layer, network layer, transport layer, and up to the session layer are implemented.



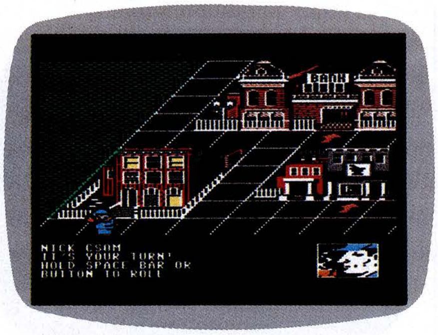
Trans-Modem: TM-1200B
- 100% Hayes Command Compatible
- Bell 103/212A Standard, CCITT V.21/22 Standard
- Auto Speed Selection (300/1200bps)
- Auto Dial/Auto Answer
- Adaptive Dial/Dial Pulse Ratio Selection
- Call Tone Progress Monitoring (Ring, Dialtone, Busy, Carrier)
- Lease Line Operation
- 65 Characters Command Buffer or Store a Phone Number for International Call

RPTI

R. P. T. INTERGROUPS INTERNATIONAL LTD.
2nd Fl., No. 280, Sec. 4, Chung Hsiao E. Rd., Taipei, Taiwan, R.O.C.
Telex: 12219 RPTI Cable: "RPTI" Taipei
Fax: 886-2-7412946 Tel: 886-2-7713366 (20 lines)



See how far you get as Sherlock Holmes solving as many as thirty dastardly crimes; or as gangster Pinky Callahan stalking Chicago's speakeasies. Stephen Applebaum reviews the best of this month's games.



Elementary, my dear micro

Title: 221b Baker Street
Computer: Commodore 64/128
Supplier: Ozi Soft
Price: $33.47

Sherlock Holmes, the fictitious deer-stalkered sleuth who proved to be such a money spinner for Sir Arthur Conan Doyle, his creator, recently embarked on his greatest adventure — to see if his inscrutable character and uncanny powers of detection can be as attractive to games players as they have been to countless numbers of readers for the past century.

The launch of Datasoft's 221b Baker Street could not have happened at a more auspicious time. Nineteen-eighty-seven marks the 100th anniversary of the first appearance of Sherlock Holmes in the book *A Study In Scarlet*.

And it isn't only Datasoft's timing that is perfect — so, too, is its game design. Even if you are not drawn by the implied presence of Sherlock Holmes, 221b Baker Street also has its attractions for those people who like Cluedo, the old board game of murder and detection. To be quite frank, 221b Baker Street is a virtual rip-off of Cluedo. But who's complaining? Cluedo always was, and still is, a good game.

It is worth noting that the game's manual credits Jay Moriarty's board game, 221b Baker Street, as the basis for the computer program, which presumably means that any blame for its similarity to Cluedo should be imputed to him and not Datasoft. However . . . .

221b Baker Street is, in a sense, an expanded version of Cluedo. The environment in which it is played has been eked out and the original house interior of the table-top game replaced with a whole town. This is not to say that the gameplay is very much different, though; for rooms read buildings.

Before a game can start, the usual routine of selecting the number of players, a joystick, and, more uncommonly, the provision or otherwise of coded clues, much be gone through.

Coded clues are for players who take their game-playing very seriously. They have been provided so that when clues are revealed onscreen, they can only be deciphered and hence understood by a player using a specific code group. There are four groups, one for each player.

However, since it is possible for the codes to be broken by outside infiltrators — that is, opposing players — each code group has been designed around four sub-groups made up of different codes. So, when players feel their security being threatened, all they have to do is tell the computer to give them their coded messages using code from one of the other sub- groups.

Unlike the rather colourless characters in Cluedo, such as Colonel Mustard, 221b Baker Street allows players to take on one of the four names that over the years have become synonymous with fictional crime detection: Sherlock Holmes, Dr Watson, Irene Adler and Inspector Lestrade.

All four characters are represented in graphic form, both in the selection sequence and throughout the entire game. During the latter they are displayed as small, animated figures which potter about the town under the direction of the player's joystick movements.

221b Baker Street comes complete with 30 individual crimes, each one with a title as fantastic as anything devised by Doyle himself. For instance, someone can't talk his way out of trouble in The Adventure of the Gluttonous Gossip, while The Adventure of the Musical Murder could very well be a statement on all that Sigue Sigue Sputnik has done for the recording industry.

The backgrounds of all 30 cases are described in some depth in a casebook provided with the game. Here can be found lots of little clues and details about who was doing what to whom at the time of the murder, theft, or whatever the crime that is being investigated.

In play, the top half of the display contains a three-dimensional view of the 'board'; this features a number of buildings connected by a path made up of squares. At the bottom of the screen is a die and a small inventory window.

Pressing the joystick's fire button causes the number on the die to

change continuously from 1 to 6. When it stops, the number shown indicates the amount of squares the player's character can move along the path.

On entering a building, players are rewarded with a nice graphical representation of the interior, and more importantly, a clue. If the building happens to be the local police station, the player whose go it is can elect to take a badge rather than receive a clue. Badges are quite handy as they allow players to lock up locations, preventing others from getting at the clues hidden in them. Buildings can be unlocked but only with a key elicited from the town locksmith.

Clues collected from the various sites can be recorded on printed slips provided with the game. These list all the locations along with a small space next to each so that players have room to write down any relevant information.

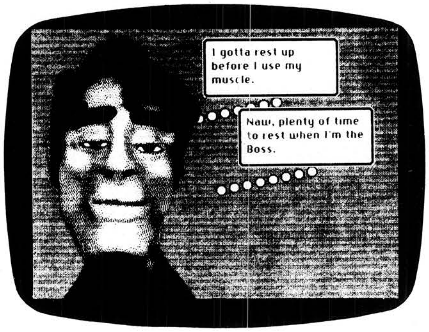
When a player has enough information to solve the crime, he or she must return to 221b Baker Street and answer a series of pertinent questions. If these are met with satisfactory replies, the game finishes and the computer explains the full story.

I don't really know why anyone should want to play computerised 221b Baker Street, seeing as there's a perfectly good version of the same thing available in board format. But if they must, Datasoft's conversion is an excellent alternative.

Cleaning the streets

Title: The King of Chicago
Computer: Apple Macintosh, IIGS
Supplier: Imagineering
Price: $79 (Mac), $60 (IIGS)

In the April issue of *APC* I reviewed SDI, the second program in Mindscape's Cinemaware range, and almost wrote off the company, the game was so bad. I am now glad I did not go the whole hog in my criticism as Mindscape has bounced back with The King of Chicago, an unusual gangster game for the Macintosh and the Apple IIGS which bears all the hallmarks of the company's past triumphs.



This latest Cinemaware extravaganza takes place in Chicago. The year is 1931, and Al 'Scarface' Capone is in the slammer. Prohibition is on but there is still whisky to be had, if you know where to get it. All over town, the speakeasies are doing a roaring trade. The Windy City is blowing at gale force.

In the years between 1931 and 1934, Chicago proved to be such a hothouse of murder and corruption that the city was considered unsuitable for a place in Murder Inc, a national syndicate formed to keep violence out of the hands of individual gangs.

Your aim in The King of Chicago is to gain control of the city by wiping out gang warfare altogether. The fruits of your labour are a well-earned place in Murder Inc.

In the game you take the role of Pinky Callahan, a member of the gang controlling Chicago's Northside. With Capone safely out of the way, Callahan figures that under his guidance, the Northside could take control of the entire city. First, however, he must 'retire' his gang's current boss and convince the rest of its members that he is the man for the job.

The King of Chicago is a strange and at times uneasy mix of arcade action and mind-bending strategy. All thirteen of its characters have individual personalities which alter each time you play the game. Since you are the main protagonist who must continually make decisions, the quirks in their personalities show themselves in the form of reactions to your actions.

Personalities, situations and events constantly change form game to game. I am not sure how true Mindscape's claim is that there are over 1,000,000,000 combination, but I did not experience two identical games. In fact, every time I won The King of Chicago, I did so by different means.

The King of Chicago takes full advantage of the Macintosh's special features. You never have recourse to use the keyboard, as everything is controlled with the mouse.

The program's graphics are some of the best I have yet seen on the Macintosh. Every character is a grotesque caricature, similar to Max Headroom. Their faces are always shown in close-up, giving you a chance to witness the work that has gone into both drawing and animating them.

When a character speaks, he or she does so by means of speech bubbles. Although they don't make any sound, you can get a good idea of each character's feelings by their ever-changing facial expressions. This is best seen in the case of Lola, Callahan's moll. She winks, pouts, frowns and smiles, using a repertoire of animation techniques, the likes of which I have not seen before.

Pinky, your character, not only talks but thinks, too, which is how the program tells you that it is ready for you to make a decision. Therefore, there are points in the game when three 'think' bubbles appear next to Pinky's head. All you have to do is choose the appropriate thought for the moment by clicking on it with the mouse.

So much for the strategy — sometimes you have to do some killing, which is where the arcade sequence comes in. When someone is to be shot, the screen displays your target and a hand gripping a gun. The idea is to move the hand and shoot before your opponent shoots you.

Humour is one of the key features of any Cinemaware game and The King of Chicago is no exception. This time, it emerges out of the characters' quips. Pinky, especially, is a master of the one- liner; few of these, though, are clean enough to mention here.

As well as humour, the game's programmers have also added pastiches of scenes from some of the great Hollywood gangster movies.

The King of Chicago is a brilliantly devised game that far outstrips others of its genre. It's good to see Mindscape back where it should be — on top.

END

5-1/4" Half Height Floppy Disk Drive for Commodore

1/3 faster than 1541
Fully compatible with Commodore C64 and C128.
The best price what you have never Seen.
The fastest delivery: 3 days after your order

OCEANIC ELECTRONICS CORP.

Please call for:

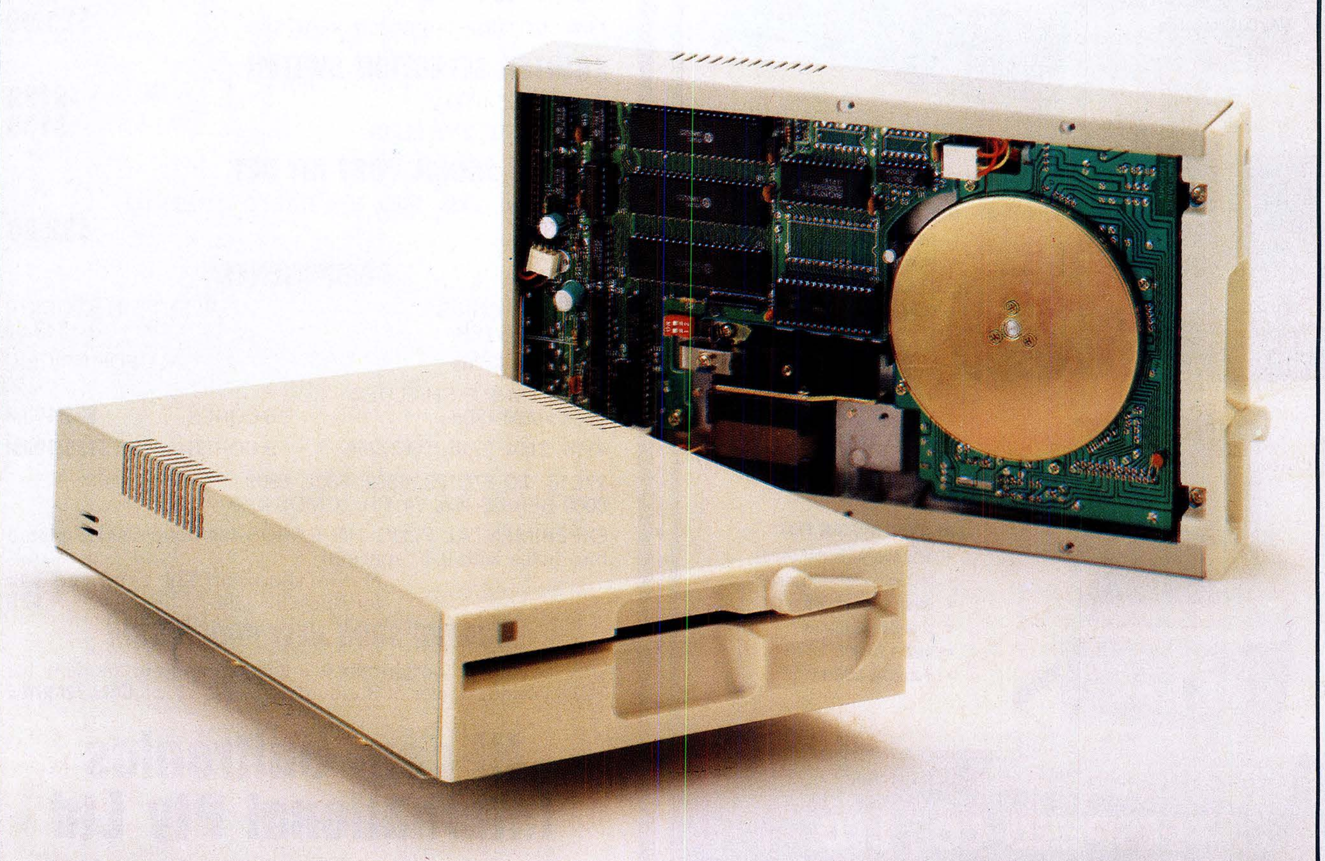
ADDRESS: 7TH. FL, 123 SEC 1,
NEI HU RD, TAIPEI,
TAIWAN, R. O. C.
P. O. BOX: 25 NEI HU, TAIPEI
TLX: 19423 OCNEC
TEL: (02) 7962377
CABLE: "OCNEC" TAIPEI
FAX: 886-02-7994316

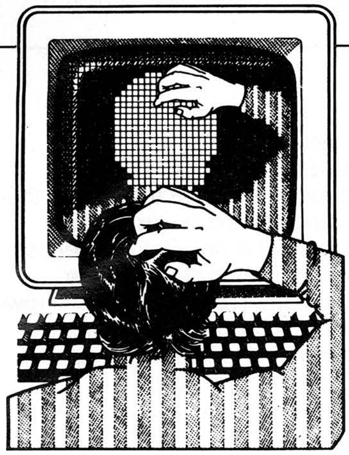
Transfer Rate (K bytes/sec)			125
Memory Capacity (K bytes)	Unformatted	Per Track	3.125
		Per Track	174
	Formatted	Per Track	0.128
		Per Track	2.048
		Per Track	81.92
Inside track recording Density (bpi)			2768
Inside Track Flux Density (frpi)			5536
Sectors Per Disk			17 to 21
Tracks Per Disk			36
Track density (tpi)			48
Number of heads			1
Track to Track Access time			6ms
Disk Rotational Speed (rpm)			300
Motor Starting Time			150ms

MEASUREMENT (mm): 150 × 50 × 270
5pcs/CTN/18.5Kg/2.22'

DISTRIBUTORS are WELCOMED!

OC-118N





TJ'S WORKSHOP

APC's monthly pot-pourri of hardware and software productivity tips. APC will pay between $100 and $200 for each tip published. Write to TJ's Workshop, 2nd Floor, 215 Clarence Street, Sydney 2000.

ProDOS RAMdisk

When you use Apple's ProDOS operating system with an Apple IIe with 128k of RAM or with an Apple IIc, you get a second disk drive that many users never take advantage of. That second disk comes free with the software and does not require any add-on hardware.

This second drive is called /RAM and is located in the 64k area of RAM that Basic and ProDOS don't use. Using /RAM can require a little creativity, but it can be worthwhile. I find it comes in handy for storing the STARTUP program and READ.TEXT, a utility that lets you look into text files on disks (or on /RAM). With these two programs on the /RAM disk, I don't have to search for my ProDOS disk whenever I need either of them. You will discover other uses for /RAM.

/RAM is automatically created whenever you boot ProDOS. It behaves exactly as do other disk drives and has an automatic prefix of /RAM. To check on /RAM's existence, type CAT /RAM <RETURN> to see that its catalog is empty. You will also notice that no physical drives come on and that the catalog messages appear much more quickly than they would if the computer were getting those messages from a floppy disk.

/RAM can hold about half the volume of a regular floppy disk. You must use care, however, when you create and store data files on /RAM. Like all data in memory, when you turn the power off, everything stored on /RAM is lost. For that reason, I use /RAM for program files rather than data files.

Copying files from a floppy to /RAM is problematic, since ProDOS has no internal Copy command. Thus, moving a program file from a floppy disk to /RAM requires a Load and Save sequence. If you want to move more than one file, the process can become quite cumbersome.

You can find help by using ProDOS's EXEC file feature, which executes a series of commands that are stored in an ASCII text file. After you've created the proper EXEC file, you can easily modify STARTUP to move files automatically to /RAM.

ProDOS's EXEC files must contain ASCII text commands for the computer to execute in the order in which it finds them. Fig 1 is the EXEC file I use to move the files from a floppy disk to /RAM.

```
PRINT "Loading STARTUP into memory..."
LOAD /USERS.DISK/STARTUP,D1
PRINT "Saving STARTUP to /RAM..."
SAVE /RAM/STARTUP
PRINT "Loading READ.TEXT into memory..."
LOAD /USERS.DISK/READ.TEXT,D1
PRINT "Saving READ.TEXT to /RAM..."
SAVE /RAM/READ.TEXT
FOR X=1 TO 1000:NEXT:HOME
PRINT "ProDOS 1.1.1"
PRINT "/RAM contains both files."
NEW
```

Fig 1 EXEC file for moving files from a floppy disk to /RAM

You can create such files with text editors, word processing programs (that save ASCII text), or from within programs designed for that specific purpose. To create the EXEC file in Fig 1, I used the Basic program in Fig 2 — it names that file MOVE.TO.RAM.

Note that some of the commands in the file in Fig 1 contain strings that are enclosed in quotation marks (ASCII character 34). Also note, in the program in Fig 2, how those quotation marks are in strings that must be enclosed in other quotation marks.

When you've typed the Basic program and run it, it creates a text file that is called MOVE.TO.RAM that acts as an EXEC file to give direct commands to the computer. You want ProDOS to execute the commands in MOVE.TO.RAM automatically, so you should run the program with your ProDOS disk in drive 1, with the write-protect tab removed.

To give the appropriate instructions to ProDOS, add the two lines in Fig 3 to STARTUP. To do that, load STARTUP and list the program lines 2600-2700. You will see the options for the main menu in STARTUP, with the choices being accepted through line 2690. Line 2691 adds an on-screen prompt, and line 2692 calls and executes MOVE.TO.RAM.

After typing in the two lines in Fig 3 (with STARTUP in memory), save STARTUP so that the disk will contain the revised copy. Then reboot your system (with Control/open-apple/Reset) and select Basic from the ProDOS menu. The computer will prompt you through the process. When the cursor returns to your control, type CAT /RAM <RETURN> to see that /RAM is no longer empty. It should contain the two files named in the EXEC file. (If you have no file named READ.TEXT, use another program that you would like to move to /RAM.)

To use either of the programs on /RAM, simply type a command similar to RUN /RAM/STARTUP <RETURN>, using the /RAM prefix so that the computer will access /RAM. Note how fast the computer now responds to that command.

By combining /RAM and an EXEC file, you can automate and speed up

```
 10 REM ----TO CREATE MOVE.TO.RAM TEXT FILE----
 20 D$=CHR$(4)
 30 PRINT D$;"OPEN MOVE.TO.RAM,D1"
 40 PRINT D$;"WRITE MOVE.TO.RAM"
 50 PRINT "PRINT "+CHR$(34)+"Loading STARTUP into memory..."
    +CHR$(34)
 60 PRINT "LOAD /USERS.DISK/STARTUP,D1"
 70 PRINT "PRINT "+CHR$(34)+"Saving STARTUP to /RAM..."+CHR$(34)
 80 PRINT "SAVE /RAM/STARTUP"
 90 PRINT "PRINT "+CHR$(34)+"Loading READ.TEXT into memory..."
    +CHR$(34)
100 PRINT "LOAD /USERS.DISK/READ.TEXT,D1"
110 PRINT "PRINT "+CHR$(34)+"Saving READ.TEXT to /RAM..."
    +CHR$(34)
120 PRINT "SAVE /RAM/READ.TEXT"
130 PRINT "FOR X=1 TO 1000:NEXT:HOME"
140 PRINT "PRINT "+CHR$(34)+"ProDOS 1.1.1"+CHR$(34)
150 PRINT "PRINT "+CHR$(34)+"/RAM contains both files."+CHR$(34)
160 PRINT "NEW"
170 PRINT D$;"CLOSE MOVE.TO.RAM"
```

Fig 2 The Basic program that creates the EXEC file in Fig 1

```
2691 HOME:PRINT "Moving STARTUP and READ.TEXT to /RAM..."
2692 PRINT D$;"EXEC MOVE.TO.RAM,D1"
```

Fig 3 The two lines you add to STARTUP to give ProDOS the appropriate instructions to make it automatically execute the commands in MOVE.TO.RAM

the procedures for accessing some of your most used files. You may see potential for also using your important program files in this way.
Gary West

Embedding setup strings

Release 1A of Lotus 1-2-3 for the IBM PC lets you use printer setup strings to change the printing characteristics of different spreadsheets. Release 2.0 goes farther in also letting you switch printer output within the same worksheet. You just precede the setup string with two vertical bars (||) and embed it within the spreadsheet text. That, at any rate, is what the manual tells you, but things aren't quite so simple.

For 1-2-3 to recognise a printer string, the string must be in the first column of the print range. You can put more than one setup string on the same row, as long as all the strings are in the first column. 1-2-3 will ignore anything that is not in the first column of any row that contains a setup string. Finally, a row that contains a setup string will not produce a carriage return and line feed unless you specifically include the printer codes for them. That is to say, without the codes, any text in the row below the setup string is added to the text that immediately follows the string.

Note, too, that the first | sign you enter into a cell is not displayed. Thus, the vertical bar is a special kind of label prefix that, when placed in the first column of a print range, signals to 1-2-3 that what follows is a printer setup string. When plain text follows this character, 1-2-3 omits the entire line when it prints.

Fig 4 shows sample setup strings (for Epson printers) embedded in the text of a spreadsheet, and Fig 5 shows the printed results. There are many differences. Since \015 turns on compressed mode and \018 turns it off, the first sentence of text is compressed and the second is not. Both sentences, along with the setup strings, were entered into the first cell of the first row of the print range. The third sentence on the same line, "This will be ignored," is ignored because it is entered in a different cell, not in the first column of the print range.

Since the code for a line feed is not embedded in the same line of text, the second line of Fig 4 is printed on the first line in Fig 5, immediately after the first two sentences of Fig 4. The printer setup string in line 3 of Fig 4 is treated as text instead of a setup string because it is not in the first column. The fourth line of Fig 1 is completely ignored in printing because it begins with the vertical bar and is in the first column of the print range.
Jim Kucherer

This is all true, and there's not a hint of it in the 1-2-3 manual. Lotus clearly designed embedded setup strings to be used on lines by themselves, in the first column of the print range. That way, they take up lines on your screen but might as well not exist at print time. By fiddling with them, you can put several on the same line, and by putting text between them, you can change printing characteristics more than once on the same line, as long as you do it within the same cell — Ed

Determining disk space

While developing a Turbo Pascal program, I found it necessary to determine the amount of free space remaining on disk. I was pleasantly surprised to find that all I needed to do was use Turbo's INTR procedure to call DOS function $36 and perform the ap-

```
                A                         B                             C
--------------------------------------------------------------------------------
1  ||\Ø15This should be compressed. \Ø18This should not. This will be ignored.
2  This should be normal width.
3                ||\Ø15This setup string will be ignored.
4  |This whole line should be ignored.
5  Another line of text.
```

Fig 4 Examples of printer setup strings used within the text of a 1-2-3, Release 2.0, spreadsheet

```
This should be compressed.  This should not.This should be normal width.
                             |\015This setup string will be ignored.
Another line of text.
```

Fig 5 Printed results of the display in Fig 4

Printer Performance

From Japan's largest vendor of computers

The new, fast, reliable, functional and cost effective
DL-2600 & DX-2400 Dot Matrix Printers

FUJITSU

DL-2600

24-Wire Dot matrix printer

* 288 cps draft/96 cps LQ
* 6000 hours MTBF
* Head Life 400 million strokes (each wire)
* 24 Kb Buffer
* Multimode/multifont
* LCD Operators panel
* Parallel or Serial Interface
* Built in Bi-directional tractor

DX-2400

9-Wire dot matrix printer

* 324 cps Draft/54 cps NLQ
* 6000 hours MTBF
* Head Life: 200 Million strokes (each wire)
* 2-18 Kb Buffer Options
* User installable colour kit option
* Parallel or Serial Interface
* Built in Bi-directional tractor

MicroHelp Performance

For years MicroHelp has been a leading distributor of Fujitsu printers. MicroHelp's helpful software support staff, price competitive sales force and Fujitsu trained technicians are your guarantee of the best deal

micro Help

MicroHelp Computers 361 St. Georges Rd., Nth Fitzroy, Vic. 3068

Tel (03) 486 1555

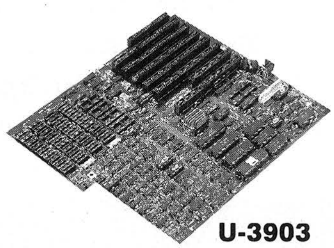
Fax (03) 486 2473

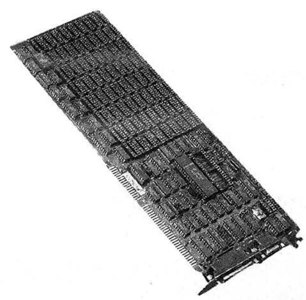
LAUNCH AND SCATTER HIGH-TECH IN PC WORLD

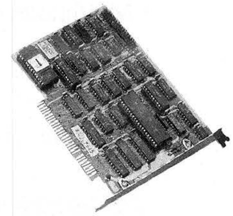
PC FAMILY

- U5900: Super 386 (80386 CPU)
- U3700: Mini 286 PC/AT Compatible (80286 CPU)
- U3600: Professional 186 PC/AT/XT Compatible (80186 CPU)
- U2900VS: RAM Disk Turbo PC/XT Compatible (8088-2 CPU)
  1.28MB RAM Board (640K Virtual RAM disk)
- U2900ST: Turbo PC/XT Compatible (8088-2 CPU)


U-3906


U-3903


U-3952


U-3953

RECOMMENDED CARDS

- U3906: Mini AT M/B, 6/8/10 MHz, Zero: Wait State
- U3903: 6/8/10MHz, AT-286 Mother Board
- U2908: 10 MHz PC/XT Mother Board
- U3957: Auto Switch EGA Card (MDA/MGA/CGA/EGA)
- U3959: Monochrome Graphic Card w/Printer (Short)
- U3952: 2MB Multifunction Card for PC/AT
- U3953: 1.2MB/360KB Floppy Disk Controller
- U3961: 5MB Memory Expansion Card

OEM/DISTRIBUTORS ARE WELCOMED.

5 TH FL., NO. 3, LANE 521,
CHUNG CHENG ROAD,
23138 HSIN TIEN, TAIPEI,
TAIWAN, R.O.C.

UNITRON INC.

THE PC MANUFACTURER

TELEX: 32445 UNITRONS
TEL: (02)9171881 (5 LINES), 9157397
FAX: 9157398

*IBM IS A REGISTERED TRADEMARK OF INTERNATIONAL BUSINESS MACHINES CORP

```
PROGRAM Free_Space_Demo;
VAR DriveLetter : Char;

  FUNCTION GetFreeSpace(TheDrive : Char) : Real;
    (* Pass in the desired drive designator A,B,C etc.    *)
    (* and return the number of free bytes left on disk. *)
    (* If TheDrive is blank then use the default drive.   *)

  TYPE BiosParamType = RECORD
                   AX, BX, CX, DX, BP, SI, DI, DS, ES, FLAGS : Integer;
                 END;
  VAR
    BiosParam            : BiosParamType;
    Drive                : Integer;
    Available_Clusters   : Real;
    Bytes_Per_Sector     : Real;
    Sectors_Per_Cluster  : Real;
    Total_Clusters       : Real;

    FUNCTION unsigned(I : Integer) : Real;
    BEGIN
      IF I < 0 THEN unsigned := 65536.0+I
      ELSE unsigned := I;
    END;

  BEGIN
    TheDrive := UpCase(TheDrive);
    IF TheDrive = ' ' THEN Drive := 0        (* 0 = default drive   *)
    ELSE Drive := 1+Ord(TheDrive)-Ord('A'); (* A: = 1, B: = 2, &c. *)


    WITH BiosParam DO
      BEGIN
        AX := $36 SHL 8;       (* $36 = DOS free space service    *)
        DX := drive;
        INTR($21, BiosParam);
    IF AX <> $FFFF THEN   (* if $FFFF is returned then an error occured *)
        BEGIN
          Available_Clusters  := unsigned(BX);
          Bytes_Per_Sector    := unsigned(CX);
          Total_Clusters      := unsigned(DX);
          Sectors_Per_Cluster := unsigned(AX);
          GetFreeSpace := 1.0 * Sectors_Per_Cluster * Bytes_Per_Sector *
                       Available_Clusters;
        END
      ELSE (* else an error occured and cannot determine free space *)
        GetFreeSpace := -1
    END; {WITH BiosParam}
  END;

BEGIN                        (* m a i n   p r o g r a m *)
  WriteLn('Enter drive letter :');
  ReadLn(DriveLetter);
  DriveLetter := UpCase(DriveLetter);
  IF DriveLetter IN [' ', 'A'..'Z'] THEN
    BEGIN
      Write('The free space available on drive ', DriveLetter);
      WriteLn(' = ', GetFreeSpace(DriveLetter):10:0, ' bytes.');
      WriteLn

    END;
  END.
```

Fig 6 How to determine the amount of free space left on an IBM PC disk

propriate calculation. The program shown in Fig 6 demonstrates the procedure I implemented.

Steve Hall

In order to make an already good program even better, I took the liberty of adding the function 'unsigned' to Mr Hall's program, and I applied it to the real values extracted from the output registers. It would take a very large disk to get values over $7FFF, but the betting odds are high that at least one of our readers is bound to have such a disk.

While I was at it, I also changed the error return from 0 to -1, since a disk might really have 0 bytes free. Unless otherwise specified, the program assumes the default drive — NR

Comparing dictionaries

I frequently want to compare the contents of two disk or a disk with a subdirectory on my PC to see which files are in one and not in other, so I wrote the UNIQ.BAT batch file in Fig 7 to do just that. To make things friendly, if you enter UNIQ typed with no parameters, the batch file gives you instructions on its use.

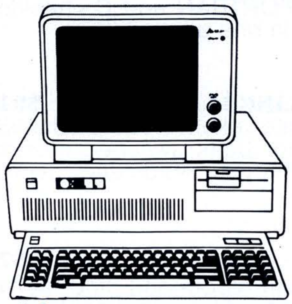
Note that this works with DOS 3.*x*. DOS 2.1 does not find files correctly.

The same principle can be used to create a batch file that will copy files

279 Victoria Street
West Melbourne 3003
Phone: 329 2555

Shop 3, Belchers Arcade
171-181 Moorabool Street
Geelong 3220
Phone: (052) 21 8566

MICRO DOS
COMPUTERS AUSTRALIA



1MEG XT TURBO UNIT
— ONLY $1649

1024K RAM
LEGAL BIOS
150W POWER SUPPLY
2 360K FDD (NAT.)
CLOCK CALENDAR
RESET SWITCH
SWITCHABLE ACCESS
LEGAL DOS
Monitor & Cables included.

PACKAGE DEAL
— ONLY $1949

XT 640K RAM
8 SLOTS
LEGAL DOS
PARALLEL PRINTER
JOYSTICK
1 BOX DISKS
Public Domain Software.
Monitor & Cables included.

PRINTERS GALORE

LX86 and tractor	=$449
Super 5 EP-1201	=$499
Fujitsu (220CPS)	=$999
Olympia NP165	=$479
Star NX-10	=$479
For others	=$CALL
Epson range	=$CALL

INTERFACE FOR COMPATIBLES

Multifunction Card 384K	=$275
Multi I/O card	=$199
Cables for above	=$45
Hard Disk Controller card	=$299
360K Floppy Drives from	=$199
Printer Cables	=$20
Keyboards AT style	=$145
Keyboard RC enhanced	=$199
Copyboard and Software	=$169
Optical Mouse & Enhanced Software	=$145
150 Watt Power Supply	=$189
8087-2	=$CALL

DISKS . . . DISKS . . . DISKS

CIS 360K	=$20
MEDAL	=$30
GOLDSTAR	=$55
VENUS	=$30
3.5 inch	=$85.50
HEAD CLEANING KIT	=$10.50
STORAGE BOX	=$25

HARD DISKS

20 MEG (BASF) INCL. CONTROLLER	=$899
30 MEG from	=$1199
OTHERS	=$CALL

VIDEO

Composite from	=$199
TTL and Card	=$349
RGB from	=$499
EGA and Card	=$1499
9 inch Comp.	=$169
Video RGB cable	=$17

BOOKS AND MANUALS
★ Wide range available ★

COMPUTERS . . . COMPUTERS . . . COMPUTERS . . . COMPUTERS

PH1602 (portable) 512K expandable to 1 Meg	=$CALL
BONDWELL BW8 (MSDOS) lap 512K weighs 4.5 Kilo	=$1745
IBM Compatible XT 640K Ram	=$1399
IBM Compatible XT Turbo 640K Ram	=$1499
IBM Compatible AT Turbo 640K Ram to 1 Meg	=$3449

★ **Compatible prices includes Monitor, Cables, Manuals** ★

★ IBM and BASF are registered trade names of their respective companies. All merchandise new. Advertised prices are cash prepaid only. Shipping minimum $4 first 2kgs. Prices subject to change.

ALL WARRANTIES ARE COVERED BY OUR OWN LARGE REPAIR SHOP OR AUTHORISED AGENT
EST OVER 14 YEARS

MAIL ORDER NOW!
CALL DIRECT! CALL DIRECT!
****DELIVERY AUSTRALIA WIDE***

DEALER LISTINGS
HOBBIES AND DATACRAFTS, SHOP C/19 BISHOP ST, DARWIN (089) 41 1181 ★ MONAGHAN SOFTWARE, SHOP 3, 144 JUNCTION ST, NOWRA (044) 21 6913 ★ CHUCKLE CHARM, CNR PORTER & LITTLE BRIDGE STS, BALLARAT (053) 31 1642 ★ CALL FOR OTHER DEALERS NEAR YOU!

NO SURCHARGE ON VISA OR MASTERCARD.

```
(* (C) Copyright 1986, D. M. Armstrong-Allen *)
{$R+}
PROGRAM self;
TYPE
  s64 = STRING[64];            (* length of a filename w/path *)

  FUNCTION Self : s64;         (* Requires MS/PC-DOS v3.00 or later *)
  VAR
    envseg : Integer ABSOLUTE CSeg : $002C;
    i      : Integer;
    temp   : s64;
  BEGIN
    i := 0;
    temp := '';
    (* Read thru the environment until we get to the end, *)
    (* i.e. two null bytes.                                *)
    WHILE MemW[envseg:i] <> 0 DO
      i := i+1;
    i := i+4;                  (* Skip the two null bytes and word count *)
    (* Get the d:\path\filename.ext as passed to the EXEC function. *)
    WHILE Mem[envseg:i] <> 0 DO
      BEGIN
        temp := temp+Chr(Mem[envseg:i]);
        i := i+1;
      END;
    Self := temp;
  END;

BEGIN
  WriteLn('This program is named "', Self, '".');
END.
```

Fig 9 A program that can locate itself on disk

```
{$R+}
PROGRAM DOSVersion;
VAR
  X,Y : integer;
PROCEDURE Dos_Version(VAR Maj, Min : integer);
TYPE
  Registers = Record
          CASE Integer Of
            1 : ( AX,BX,CX,DX,BP,SI,DI,DS,ES,Flags : Integer );
            2 : ( AL,AH,BL,BH,CL,CH,DL,DH : Byte );
          END;
VAR
  R : Registers;
BEGIN
  WITH R DO
    BEGIN
      AH := $30;
      MSDOS(R);
      IF AL = 0 THEN BEGIN Maj := 1; Min := 0; END
      ELSE BEGIN Maj := AL; Min := AH; END;
    END;
END;

BEGIN
  Dos_Version(X,Y);
  WriteLn('DOS version ',X,'.',Y);
END.
```

Fig 10 A simple routine to check the current DOS version

DOS environment and search it yourself. Under DOS 3.x, you can run any program simply by spelling out its full pathname. By combining these two methods with the simple test for the current DOS version used in the DOS_Version procedure that I've included in Fig 10, you could construct a nearly foolproof procedure for locating your program's data files or overlay files, no matter where the program was called from — PS

QuickBASIC 2.0 and the EGA

I've recently bought Microsoft's QuickBASIC 2.0 for the IBM PC and have been converting some of my older Basic programs using graphics to work with the Enhanced Graphics Adaptor (EGA) high-resolution modes. These programs now use SCREEN 9, which offers 640- by 350-pixel resolution with 16 colours.

However, the way that tiling works with the EGA really has me confused. It's not explained at all in manual, and I've had to do it by trial and error. Can you shed some light on this subject?

Further, the BSAVE and BLOAD commands don't seem to work correctly with the EGA. How can I get them to work?

Greg Griffith

The 600-page QuickBASIC 2.0 manual looks complete, except when you need to find something in it. It's amazing how much is not in there at all. EGA graphics certainly deserves a more ex-

```
DefInt A-Z
Def FnRand(X) = Int (X * Rnd)
Screen 9
For I = 1 to 25
        Line (FnRand(640),FnRand(350))-(FnRand(640),FnRand(350)),FnRand(16),BF
Next I
Call EgaBsave ("SAVESCRN", 0, 80 * 350)
Cls
Call EgaBload ("SAVESCRN")
End

Sub EgaBsave (FileName$, Offset, Length) Static
        Def Seg = &HA000
        Out &H3CE,4 : Out &H3CF,0
        Bsave FileName$ + ".BLU", Offset, Length
        Out &H3CE,4 : Out &H3CF,1
        Bsave FileName$ + ".GRN", Offset, Length
        Out &H3CE,4 : Out &H3CF,2
        Bsave FileName$ + ".RED", Offset, Length
        Out &H3CE,4 : Out &H3CF,3
        Bsave FileName$ + ".INT", Offset, Length
        Out &H3CE,4 : Out &H3CF,0
End Sub

Sub EgaBload (FileName$) Static
        Out &H3C4,2 : Out &H3C5,1 : Bload FileName$ + ".BLU"
        Out &H3C4,2 : Out &H3C5,2 : Bload FileName$ + ".GRN"
        Out &H3C4,2 : Out &H3C5,4 : Bload FileName$ + ".RED"
        Out &H3C4,2 : Out &H3C5,8 : Bload FileName$ + ".INT"
        Out &h3C4,2 : Out &H3C5,&H0F
End Sub
```

Fig 11 This QuickBASIC 2.0 program demonstrates the use of two subroutines to save and load high-resolution EGA graphics displays to disk

tensive discussion. The organisation of video memory in the EGA high-resolution modes is fundamentally different from the Colour Graphics Adaptor (CGA). In the CGA medium-resolution mode (320 by 200 pixels with four colours), each pair of 2 bits represented 1 pixel. That pixel could be one of four different colours.

The EGA high-resolution video memory is organised as four colour planes. There are separate planes for blue, green, red, and intensity. Each bit in each plan corresponds to 1 pixel. In the PAINT statement, the first 4 bytes in the tiling string are for these four colour planes. The first byte represents the bit patterns for the blue plane, the second byte for the green plane, the third byte for red, and the fourth byte for the intensity plane.

For instance, the statement

PAINT (X,Y), CHR$(&HC8)+ CHR$(&HC1)+CHR$(&H8f)+ CHR$(&H81)

(Although shown on three lines so as to fit within the column, the statement above must be entered as a single line — Ed) means to use pixel patterns of 11001000 (or &HC8) for blue, 11000001(or &HC1) for green, 10001111 (or &H8F) for red, and 10000001 (or &H81) for intensity. These 4 bytes define the colours of a set of 8 pixels. The colours will be combined with one another so that the pixels from left to right are:

Pixel	*Colour*
1	*High-intensity white (all on)*
2	*Cyan (blue and green)*
3	*Background (all off)*
4	*Background (all off)*
5	*Magenta (blue and red)*
6	*Red*
7	*Red*
8	*Yellow (green, red, and intensity)*

If you use the PALETTE statement, these colours will be different. If you use more than 4 bytes, the second set of 4 bytes will apply to the next scan line.

The BSAVE and BLOAD statements are more of a problem, but this again results from the organisation of EGA high-resolution video memory into colour planes.

The four colour planes of the EGA all occupy the same address, starting at A000:0000. When reading from the memory space, only one of the colour planes may be active. It is necessary to switch between the applicable colour planes when doing a BSAVE and BLOAD and save each of the four colour planes separately in different files. This is done by manipulating output ports on the EGA.

Fig 11 shows a QuickBASIC 2.0 program with two subroutines called EgaBsave and EgaBload that will do this for you. The program draws some random rectangles on the screen and calls EgaBsave. This has three parameters:

EgaBsave(filespec,offset,length)

Filespec *is a filename without an extension. It can have a path.* Offset *will be 0 when you're working with the first video page.* Length *is the number of pixels on the display divided by 8. EgaBsave switches through the four colour planes for reading the display and does a BSAVE on each one while appending the extension BLU, GRN, RED, and INT to the filename.*

After that, this demonstration program clears the screen and loads the four colour planes back in using EgaBload. EgaBload requires only a filespec. It switches through the four colour planes for writing to the display and BLOADs each of the four files. Particularly if you're loading these files from a floppy diskette, you'll clearly see that each of the four colour planes is loaded separately.

Note that manipulating the EGA registers in a program that uses the EGA may have some unforeseen consequences, but it appears that the Basic routines leave the EGA in a normal state and don't seem to be adversely affected when you mess with the registers — CP

Screen slider

The short Apple II machine-language program in Fig 12 lets you slide a line of 40-column text off the screen to the right, accompanied by sound. To use the routine in your own Applesoft Basic programs, simply include lines 20-50 near the beginning of your program.

Then do a VTAB n (where *n* is in the range from 1 to 24) to select the line you want to slide and CALL A. The address A can be any convenient location with 29 unused contiguous bytes.

The 88 in line 50 controls the speed of the slide. Larger values produce a slower slide, and smaller values

```
10 PRINT  CHR$ (21): REM   GO TO 40 COLUMN MODE
20 A = 768: REM   MACHINE LANGUAGE ADDRESS = $300
30 FOR I = A TO A + 28: READ D: POKE I,D: NEXT : REM  INSTALL ML
40 DATA 162,40,160,39,136,177,40,200,145,40,136,208,247,169
50 DATA 160,145,40,44,48,192,169,88,32,168,252,202,208,230,96
60 A$ = "ABCDEFGHIJKLMNOPQRSTUVW": REM  FILL SCREEN
70 FOR V = 0 TO 39: PRINT A$;: NEXT : REM    FILL SCREEN
80 FOR V = 1 TO 23: VTAB V: CALL A: NEXT : REM SLIDE LINES
90 GOTO 70: REM  KEEP IT UP!
```

Fig 12 Screen slider program

produce a faster one. You can experiment to determine the optimum speed.

Lines 60-90 give a simple demonstration of the technique.

R Moore

Input tricks

As you probably realise if you've done any programming in Applesoft, if you try to enter commas or colons with an INPUT statement, you lose everything after the colon or comma and then get an EXTRA IGNORED message. Several public-domain and commercial programs can get you around this problem, but the easiest way requires no special programming at all.

```
10   A$="": PRINT "ENTER CITY,
     STATE, POSTCODE";
20   CALL - 657
30   FOR I= 512 TO 767
40   IF PEEK (I) < > 141 THEN A$
     = A$ + CHR$ (PEEK(I) - 128)
     : NEXT
50   PRINT A$
```

The actual routine is lines 20 through 40 in the listing above. The additional lines demonstrate how the routine can function in a program. It works on all Apple II series computers, under both ProDOS and DOS 3.3. You may enter any non-control character, and the left- and right-arrow editing keys work, although you can't use the Delete key.

V O'Connor

MacDraw/LaserWriter

The following walkthrough tip will show you how to use MacDraw and an Apple LaserWriter to produce professional quality disk labels. Additionally, you will require the MacDraw document discussed, Laser Disk Labels. You can obtain this document either from Microtex on Telecom's Viatel (page *6663#) or by sending a Mac disk with a stamped self-addressed envelope to the attention of Jean, *APC*, 2nd Floor, 215 Clarence Street, Sydney 2000. The other required materials can be acquired at most major art supply stores. The following list of materials has been found to be the best, however you may substitute.

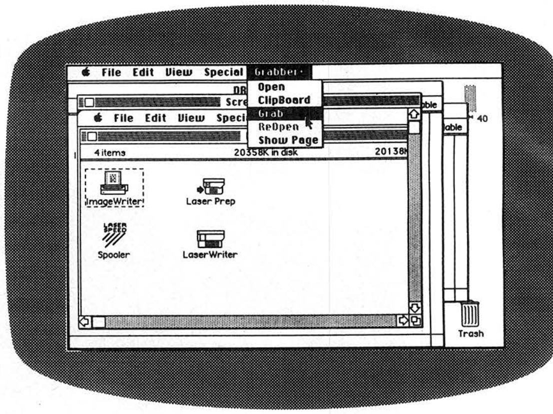
You will need:

An application or DA that allows you to copy information from a MacPaint document, Pantone paper (available from Artistcare Australia, which has offices in Sydney, Melbourne, Adelaide and Brisbane; it sells for $5.25 per sheet (of 51x66 cms) and comes in a range of colours), 3M double coated transfer tape (3M 465 — ensure you buy a sufficiently wide reel; prices vary according to width but you can expect to pay around $10. If you cannot locate a supplier, call 3M in the capital city of your state), and clear mat spray or a clear 'fixative' (for example, Aerosolve product number 308 which sells for $5.49 a can; telephone (03) 729 1488).

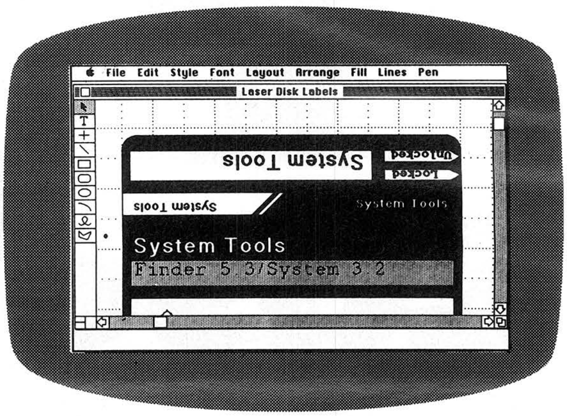
(Due to some idiosyncrasies of LaserWriter fonts and various versions of MacDraw, you might find that your file does not look exactly like ours. It is possible that you have to change the fonts and/or move the text into position. Correct the disk label to your liking. We used the Helvetica and Courier fonts for our label — Ed).

Now, refer to the figures on this and the next page for instructions.

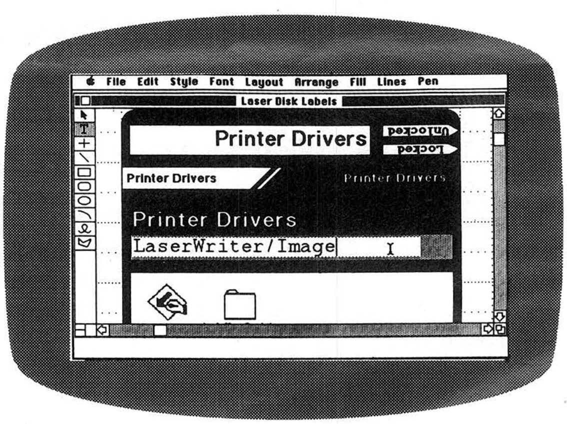
In the Finder, obtain a screen dump of the disk contents using COMMAND-SHIFT-3. Enter into a paint application or DA and individually copy each icon you want on your label and place it onto the Scrapbook. Attempt to lasso the icons, eliminating the 'white space'. When you bring the icon bitmaps into MacDraw you can resize them as desired. If Draw and the painting program are on different disks you must now move the Scrapbook File to the MacDraw diskette.



Enter MacDraw and open the file 'Laser Disk Labels'. Notice that all of the items, including text, are enlarged to twice the size of a normal disk label. Before printing confirm that Page Setup . . . has the reduction set to 50% so that the label prints at normal size. In addition, note that on the edge of the label the name of the disk is printed right side up and upside down. This is so the disk name is always visible regardless of whether the disk is in the floppy drive or in storage.



Start by changing the disk name at four places. Two of these four are upside down. The ones that are upside down must be rotated two times (to the right or left) in order to edit the text. After the four titles are changed, rotate the two upside down items back to their proper orientation. You will probably have to adjust the text's position within the label due to the fact that the disk name is a different size than originally. In the greyed area, change the text to a short description of the disk contents.



Further instructions overleaf . . .

HFS

If you are using the Macintosh Finder and want to make a backup of a 400k HFS disk, you must hold down the Option Key when you confirm the 'Completely Replace Contents . . . ' dialog box. If this is not done, your backup disk won't be a HFS disk. If the source disk is a MFS disk and you hold down

We did...!

HEROES on HARDWARE (Ex Tax)

Disks:	20Mb Hardcard (45ms)	**1295**
	20Mb Seagate with DTC controller	**745**
	360k Mitsubishi FDD	**225**
Expansion Boards:	Intel Above Board XT	**525**
	Hypertech Memory (512k incl.)	
	Hypertech Multifunction (512k incl.)	**399**
Graphics Cards:	Vega Deluxe, EGA, CGA etc.	**588**
	Hercules Graphics Card Plus	**455**
	Taiwanese Colour or Mono	**195**
Intel Chips:	8087 Math Co Processor	**239**
	80287-8 Math Co Processor	**610**
Monitors:	Hi Res Colour - NEC or Phoenix IV	**679**
	Hi Res Green - NEC	**175**
Modems:	Nettcom 1234A Internal	**889**
	PC in modem	**399**

TOP DEALS ON EPSON

PRINTER PERFORMANCE

FREE CABLE

EPSON:
- 12 months warranty
- Most models have multiple fonts

FX 1000 230 cps, new release	**795**
EX 1000 300 cps, colour option	**965**
LQ 1000 - letter quality	**990**
LQ 800 - letter quality, 80 col	**699**
LX 86 - top seller	**405**
LQ 2500 - top of the range, 5 fonts	

NEC:
- 24 pin letter quality
- quiet performance

P6 pinwriter, 216 cps, 80 col	call
P7 pinwriter, 216	call
P5 pinwriter, 264 cps	call

Roland Plotters:
- Excellent value
- Full range of features

DXY 880, A3, 8 Pen, HP compat	**1660**
DXY 980, A3, 8 Pen, HP compat	**2149**
Microline & Brother:	call

PROUDLY AUSTRALIAN

Add-on Boards by Hypertech:

Hyperace 286 Plus accelerator card	**775**
Hypertec multifunction card with 512k memory, clock, etc.	
Hyperam AT extended memory board (512k)	**799**

Modems by Netcomm:

1234A Smartmodem (2400, 1200, 300, 1200/75 baud rate)	**1099**
123A Smartmodem (1200, 300, 1200/75 baud rate)	**899**
123A-In modem (1200, 300, 1200/75 baud rate)	**745**
Others	call

Software:

PC Alien - Reads and writes almost any format	**82**
Smartkey - Keyboard enhancer	**66**
Postcoder - Auto post code look up	**99**
Business Manager (integrated accounting)	**595**

MELBOURNE TRAM STOPPERS (Ex Tax)

Tape Back-up Unit-external, 20Mb. Don't spend your day backing up on floppies.	**$999**
The perfect marriage JAVELIN financial modelling & RAMPAGE extended memory board.	**$785**
GEM Collection at 60% off list price. Word processor, paint & desktop.	**$140** RRP $360
Hardcard 20 - Unquestionably the best performance 20Mb hardcard - voice coil, 45ms.	**$1250**

SYSTEMS STUPIDITY

FREE Printer with each System - *PLUS* GEM Desktop Software.

SYSTEM UNITS - KEYBOARD, FDD, 640k	**JUR PRICE (Ex Tax)**
Olivetti M24 - High performance	**2250**
Epson PC - Clone buster, 12 month warranty	**1650**
Epson PC +, Turbo, 12 month warranty	**2199**
Epson AX - Best value AT, 12 month warranty	**3999**
NEC Powermate	call
For totally configured systems	call

SUPPORT

4. Delivery and Insurance for only $7.50 anywhere in Australia (Printers and PC's excepted).

NOTE:

ADD 14% FOR TAX INCLUSIVE PRICES.

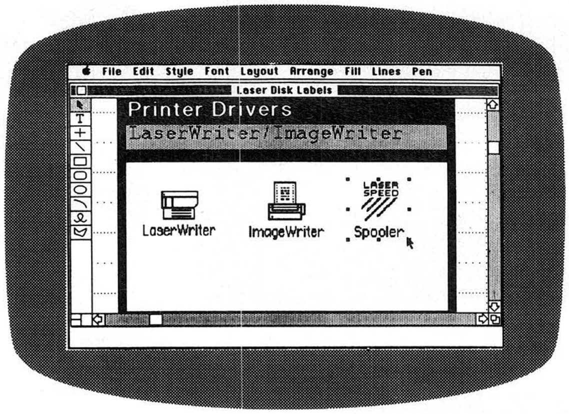
Prices are correct at time of printing but may alter without notice.

Bankcard and Visa cards accepted.

The Computer Trader

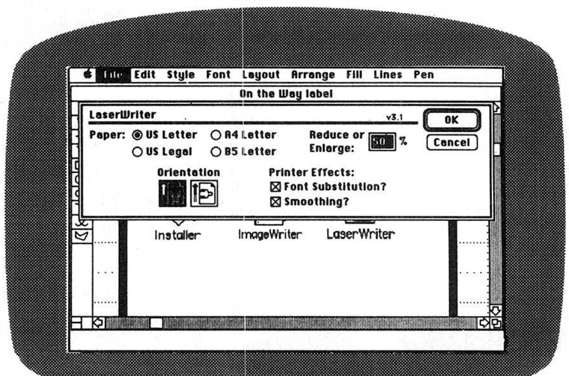
MELBOURNE
(03) 417 7044 98 HODDLE ST, ABBOTSFORD 3067
SYDNEY (02) 552 1755
261 BROADWAY

TJ'S WORKSHOP



Remove the icons found in the centre of the label. Open the Scrapbook file and cut and paste each icon into the document.

After all of the icons have been pasted into the document, resize each as large as possible and align them in the icon area. Make sure to make the icons as large as possible because this document is twice the size of the actual label.



You now have the label ready for printing. Before printing, check that the LaserWriter is selected for printing (using the Chooser DA) and make sure that the reduction in Page Setup . . . is set for 50%. You should print sample labels and make corrections as desired. Use Save As . . . to save your finished label under a different name so that the template is not altered.

Cut the Pantone paper, resizing it forfeeding into the LaserWriter. Print your label on the Pantone paper. In the future you may wish to include multiple labels for printing on the paper. Cut the label to size and attach the double-coated adhesive tape to the underside. Finally, use a clear 'fixative' or clear mat spray to give the label a finished look. The spray should not be sprayed anywhere near the computer or printer. Sprays stay airborne and travel great distances.

the Option key when you are given the 'Completely Replace Contents . . .' dialog box, the destination disk will have HFS on it.
P Borenstein

Resedit

Hold down the Macintosh option key to override ResEdit's templates to open all resources in hexadecimal format. For example, hold down the Option key while double-clicking a ICN# resource to get the hexadecimal representation, instead of the icon editor.
Philip Leroy

MacPascal

When doing a large number of remarks, one after another, hit the Return key after the end of each line, instead of typing a right brace. MacPascal will automatically type the right brace as well as the left one for the new comment line on the line below.
J McSpiritt

END

30 Meg Now Standard

Made in USA 1 Year Warranty

KAYPRO introduces NON-OBSOLESCENCE

NEXT YEAR'S TECHNOLOGY?
That's easy. Replace the existing IBM PC/XT board with an IBM PC AT-compatible board, available now; IBM 32-bit standard, available soon; or whatever the future holds.

MEMORY-HUNGRY SOFTWARE?
The KAYPRO PC comes standard with 768 KB three times the IBM standard – more than enough for the most demanding programs

HIGH-RESOLUTION GRAPHICS?
KAYPRO's standard multivideo board features perfect monochrome clarity plus high-resolution color (IBM CGA). But, if it's IBM EGA that you want? - simply snap in a board.

FURTHER SYSTEM EXPANSION?
But of course! The KAYPRO PC is ready for anything. With six available slots, add what you need – networking, modems, more memory – the sky's the limit.

PLENTY OF STANDARD FEATURES?

DUAL SPEED:
Go from 4.77-8 MHz with just a flick of a switch!

POWER SUPPLY:
A generous 132 watts of power for even the most demanding hard drive.

FLOPPY DISK DRIVES:
Dual IBM-compatible floppy disk drives standard or slide in the drive of your choice.

HARD DRIVE EXPANSION:
Space provided for easy addition of internal hard drives.

BUNDLED SOFTWARE:
A full selection of business software for today and tomorrow.

KEYBOARD:
Detachable, IBM PC AT-style keyboard with security keylock.

Kaypro's new "Snap-In" technology lets you exchange or update all vital system components in seconds.

Computer technology changes with lightning speed. In the time it takes to read this, there will be dozens of new products on the market that make their predecessors obsolete. With that in mind, we'd like to give you a bit of good news. The fully IBM PC/XT compatible KAYPRO PC has been designed to eliminate computer obsolescence. That means it's a snap to update all vital system components – right down to the system's microprocessor.

And, if it's topnotch features you want, look no further. The KAYPRO PC delivers: IBM PC AT-style keyboard, two disk drives, dual speed board, built-in color capability, and 768k of standard memory. The culmination of Kaypro's 33 years of electronics engineering innovation, the American-made KAYPRO PC just may be the last computer you'll ever need.

Price: **$2495**
$3295★ *(30 meg)*

For more information or the location of your nearest dealer call
(02) 542 3866 TLX: AA176269

KAYPRO® CORPORATION
Innovators of Electronic Products for Over 33 Years

* suggested retail
★30meg does not include a color board.

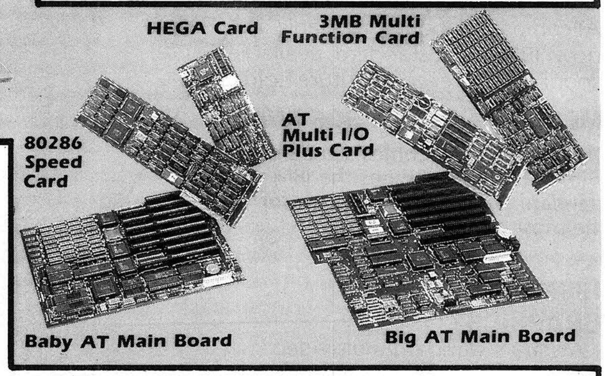
*Suggested Retail Price Trademarks: IBM, International Business Machines

MORETEC IS NO. 1!

When You Want the Best, Come to MORETEC!

Established in 1979, Moretec is a specialiest of full range of IBM PC/AT compatible computers and add-on cards.

Contact us today for full details and ask about products not listed.

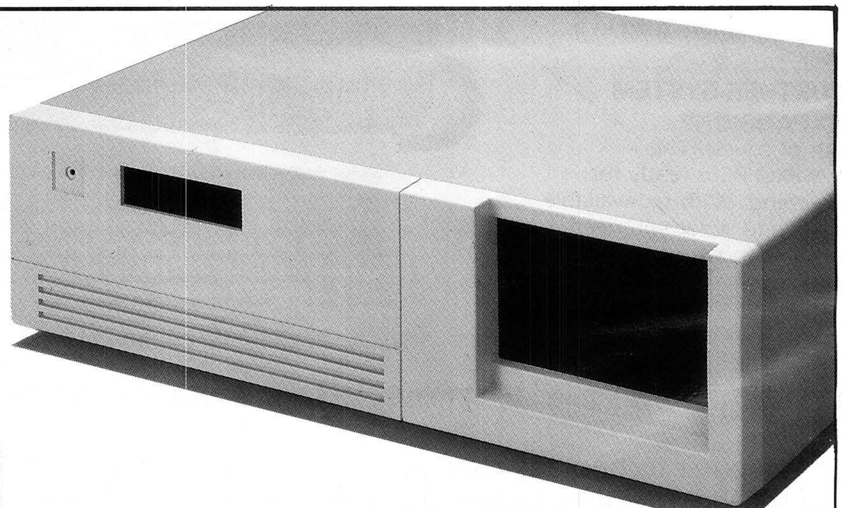


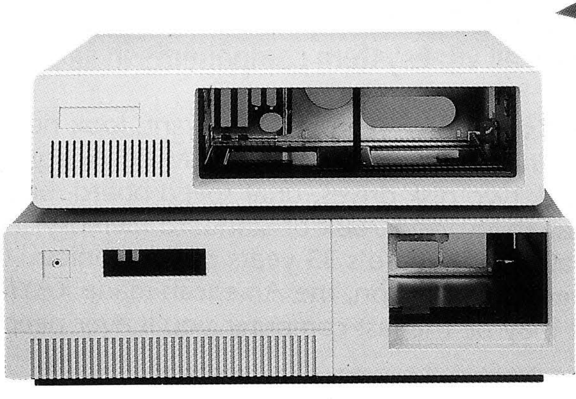
MORETEC

MORETEC ELECTRONICS IND. CO., LTD.

2nd Fl., No. 10, Lane 575, Tun Hwa S. Rd., Taipei, Taiwan, R.O.C.
Fax: 886-2-7009832 Tel: 02-7089551 Tlx: 20190 AUDIVIO
Factory:
2nd Fl., No. 565, Sec. 7, Chung Shiao E. Rd. Taipei, Taiwan, R.O.C.

WE ARE TAIWAN's LEADING PROFESSIONAL CABINET MAKER



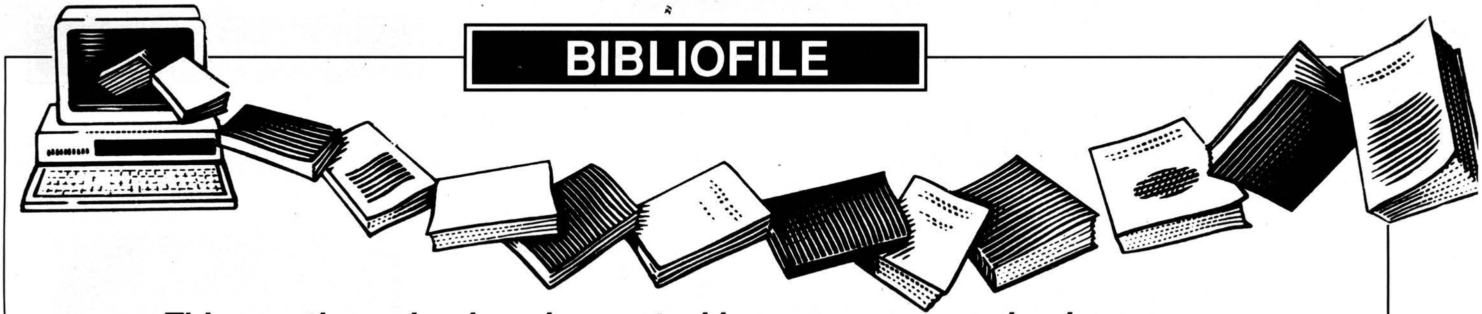


We assure you of the offering of our high product quality and competitive pricing as we adopt integrated production, from sourcing of materials to the final production. To always maintain product quality at a high level, we control every step of the manufacturing process. Contact us today for more information!

* **Welcome to tour our factory when you are on your next buying trip to Taiwan.**

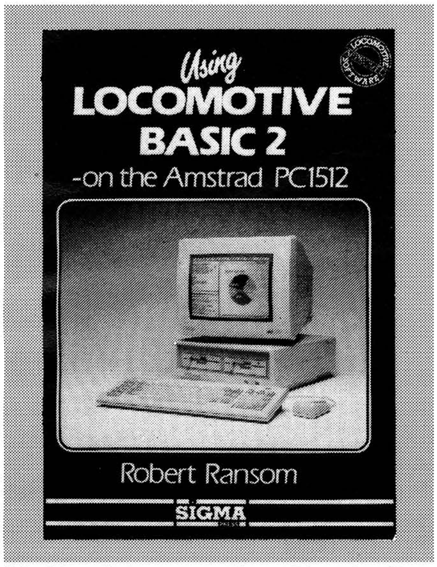
LING YIH *CO., LTD.*

9F-3, 57 FU-HSING N. RD., TAIPEI, TAIWAN, R.O.C.
TEL: (02)771-7166 FAX: (02)711-3506 TLX: 20232 LINGYIH



BIBLIOFILE

This month our book reviewers tackle some programming languages; mastering the 68000 processor and accounting on the IBM PC.



Using Locomotive Basic 2 — on the Amstrad PC1512

Author: Robert Ransom
Publisher: Sigma Press/Jacaranda Wiley
Price: $43.05

'Knowledge of simple BASIC programming will be useful knowledge for the intending reader of this book.' An essential prerequisite I would have thought as I honestly believe that a novice Basic user would otherwise be confused by this book. The author has a clear, explanatory style, but he does take it for granted that the user has a good working knowledge of Basic and the comparisons between Basic and Basic2 invariably crop up: *'The real power of Basic2 over earlier Basics is the use of the GEM visual interface'; 'the main differences are the provision of the mouse and the multiple screen windows';* and *'one fundamental difference . . . there are no line numbers . . . the second difference is the use of lower and upper case text';* and so on. But if you are already familiar with Basic, then this is a very neat and handy little book to have.

To get the most benefit from *Using Locomotive Basic,* you would need to be sitting in front of your Amstrad PC1512 (or IBM compatible) with one hand on your invaluable mouse and the other on this book; otherwise, it's very hard to visualise the effects of 'double-clicking' and 'F10-ing'.

The first section covers an excellent introduction on how to get Basic2 up and running, finding your way round the GEM desktop, how to use the windows and a general chat about the Basic2 environment. The next section moves on to more detailed work: functions, program input, using the mouse, how to translate from other Basic dialects, using alert boxes, and so on. The graphics chapter is stimulating, with plenty of examples, figures and, of course, graphs, while the final section provides appendices on Basic2 commands, functions, character codes, error codes and messages, and screen and key maps.

Using Locomotive Basic2 is a tidy, concise book: just make sure you brush up your Basic first.

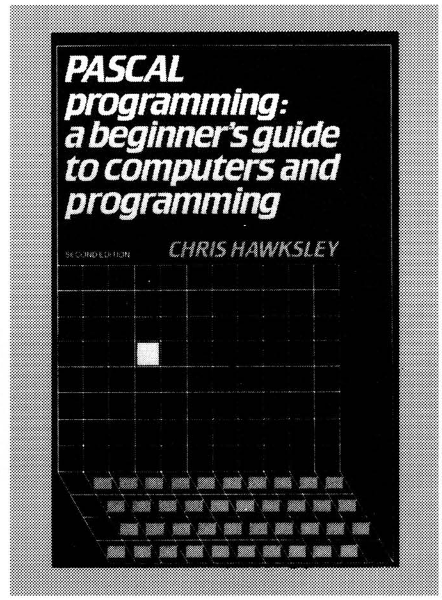
Lorna Kyle

Pascal programming: a beginner's guide to computers and programming

Author: Chris Hawksley
Publisher: Cambridge University Press
Price: $67

I would have thought it rare for any beginner's programming manual to expect that you could actually sit down and read the opening chapters and then feel encouraged to read on. *Pascal programming: a beginner's guide to computers and programming* is the exception. Chris Hawksley walks us through a bright and colourful garden before leading us up to the door of the Pascal house. His introduction on the foundations of programming, algorithms, symbolism, problem-solving, languages and operating systems is really very enjoyable and straightforward. He assumes that his reader has no previous knowledge of computing and was not necessarily born with a BSc or MSc in Mathematics tucked under his belt.

However, it is not until Chapter 5 that



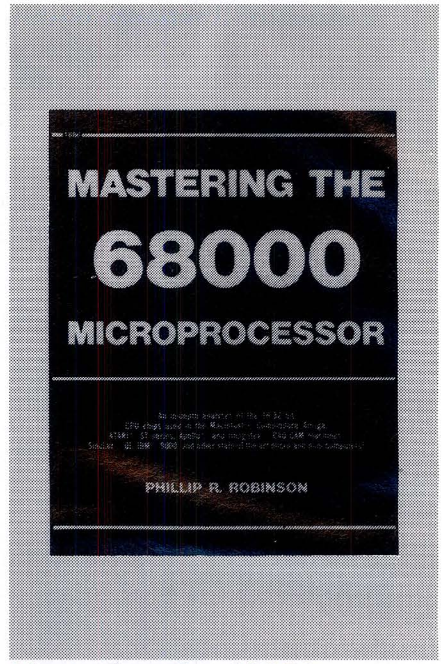
the author begins to discuss the Pascal language: *'Pascal embodies many of the features that are widely acclaimed today as being vital to good programming practice.'* Syntax diagrams are introduced which, although initially a strange concept to grasp, are intended to remove ambiguity in program construction and are worth persevering with. The author moves through identifiers, declarations, statements, expressions, standard functions, reading in, writing out, control structures, repetition loops, procedures, variables and parameters, all with an ease of flow.

Exercises are provided at the end of every chapter with answers given in an appendix, and examples are plentiful throughout the text. Structured programming, arrays, text processing, analysing data, advanced functions and presenting results are all covered in Part 2.

This second edition has been revised in order to conform to the definition of standard Pascal specified in the international standard ISO 7185. All in all, *Pascal programming* is a well-written and instructive book, and an ideal and inexpensive introduction to computers and languages in general.

Lorna Kyle

BIBLIOFILE



Mastering the 68000 microprocessor

Author: Phillip R Robinson
Publisher: TAB Books/Thomas Nelson
Price: $32.90

Mastering the 68000, despite its title, is really a general introduction to microprocessors and assembly-level programming. Phillip Robinson believes that the 8-bit processors, such as the 6502 and Z80 as used in early micros, were created with little thought for the programmer. By comparison, the 68000 was designed as a programmers' processor.

The book assumes two things: that you have a working knowledge of Basic; and that you have access to one of the following 68000-based machines: the Atari ST, the Apple Macintosh, the Commodore Amiga, the Sinclair QL or the IBM 9000. Building on your experience as a Basic programmer, Robinson very gently takes you through the fundamentals of machine-language programming. The emphasis is very much on the software aspects of the 68000, although some time is devoted to 68000 derivative and support chips.

Through special boldface references supported by extensive appendices, the book indicates any material that might depend on the reader's machine, operating system or assembler.

This is much more than an excellent introduction to programming the 68000; it is also a primer on how to write an assembly language textbook.

Graham Wood

END

Now you can master MS-DOS with Tim Hartnell's

MS-DOS Tutor!

From novice to expert, in just a few hours!

For just **$49.95**, you can now quickly gain mastery over MS and PC-DOS. The MS-DOS Tutor includes tutorial disk and detailed manual. Covers DOS 2.nn and 3.nn

Become a master of all of the following vital subjects:

GETTING STARTED WITH DOS: overall view of the operating system; booting up DOS; entering commands
FORMATTING A DISK: copying DOS, SYS and VER
COPYING FILES & DISKS: How to use DISKCOPY, DISKCOMP, CHKDSK, COPY, COMP, RECOVER, DEL, DATE/TIME
USING FILES: definition of file types, locating groups of files, creating and transferring, copying and verifying, non-standard DOS files
HIERARCHICAL FILING SYSTEMS: what they are, directory structures, tree-structured directories, MKDIR, PATH, TREE, RMDIR, CHDIR, the File Allocation Table, recovering deleted files
EDLIN, THE EDITOR: inserting text, interline editing, cut and paste, using COPY, DELETE, INSERT, LIST, REPLACE, TRANSFER, WRITE
REDIRECTION, PILES, FILTERS: redirecting standard input/output, SORT, FIND, PROMPT, SET
Plus BATCH FILES, CONFIGURING YOUR SYSTEM, USING THE HARD DISK, DOS AT A GLANCE!

Send for our latest catalogue!

We have cut-price software for IBM PC, Apple II and IIGS, Mac, Amstrad 464/6128, Amiga, Commodore 64/128, Atari & Atari ST!

Interface Publications (Aust.) Pty. Ltd.,
Chelsea House, 34 Camp Street,
Chelsea, Vic., 3196 *(03) 772 7566*

OK Tim, Please send me the following:

[_] MS-DOS Tutor $49.95 ($41.62 ex. tax)
[_] Paradigm Power Utilities $29.95 ($24.95 ex. tax)
[_] boxes of DSDD 5¼" disks $14.95 ($12.95 ex. tax)
[_] boxes of SDDD 5¼" disks $13.50 ($11.74 ex. tax)
[_] boxes of DSDD 3¼" disks $46.17 ($40.00 ex. tax)
[_] boxes of SSDD 3¼" disks $44.95 ($38.67 ex. tax)
[_] Latest catalogue for: *[_]IBM PC [_]Apple II/IIGS [_]Mac [_]Amstrad 464/6128 [_]Atari/Atari ST [_]Commodore 64/128*

Total software/disks ordered $__________
Plus post/packing $ 3.00
Total enclosed $__________

Or charge my [_]Visa [_]Bankcard [_]Mastercard
*Card no.*______________________________

Name ______________________________
Address ______________________________
______________________________ P'code______

apc Jun 87

New this month!

PARADIGM POWER UTILITIES!

Just $29.95!

Give your PC the gift of power!

The Paradigm Power Utilities

Created by Tim Hartnell for all MS-DOS computers, *The Paradigm Power Utilities* allow you to *retrieve deleted files,* give you *byte by byte* control over your disks, simplify and speed-up your work with the PC, and *much more!* The major utilities in the *Paradigm* collection include:

• COMEBACK
You know the feeling. You've just deleted a file, and you suddenly realise that you've done something very stupid. Instead of killing yourself, just type in ***COMEBACK filename***, and it will be back. ***Whew!***

• MODIFY
You can now examine, and modify, your disks, *byte by byte!* Detailed instructions show how to start working with MODIFY. After that, the sky's the limit!

• SECTSAVE
Locates and (if possible) rescues *bad sectors* on disks

• LISTFILE
Display the contents of an ASCII file, *line by line*, with full operator positioning commands

• PRINT SPOOLER
Set up the Paradigm Spooler to free your computer for new tasks while the printer bashes away in the background. You decide the size of the spooler, and also tell it *how many copies* you want. A cinch to install.

• PARADISK
Here's value. A high-powered RAMDISK to be your third or fourth drive. The size of the disk is variable and is set in CONFIG.SYS on your boot disk. Full details of installation provided, plus a direct example of how to use it effectively.

• DISKCAT
Make a quick, straightforward directory of your disk

• LABEL
Change or add a *volume name* to a disk.

• CHANGER
Alter file attributes; marking files as hidden, readonly, system or normal, and to set or rest the archive bit.

• FILEDUMP
Allows you to dump a *complete* file in HEX and ASCII.

• GCOPY/GDEL
Simplifies task of copying or deleting files; mark them all, and then sit back and let the PC do the work.

Plus more valuable utilities!!

The Paradigm Power Utilities come complete with a detailed, easy-to-follow manual.

Protocols

This month Steve Withers and Peter Tootill discuss the various file-transfer protocols currently in use.

Last month we looked at error-correcting modems. Now it's time to put the spotlight on file-transfer protocols. There is a number of protocols in regular use. The 'original' file-transfer protocol (and still the most common), Xmodem, was developed by Ward Christensen in the US in 1977. It was very simple and he made it available in the 'public domain'. Now it is included in just about every commercial and public domain terminal package and bulletin board system. Other protocols you will come across are listed in Table 3 with an explanation of their basic vital statistics, together with some indication of where you are likely to come across them.

'A satellite link can add half a second to the round trip time needed to acknowledge each block. The total overhead then increases to around 200 seconds.'

There have been a number of enhancements to the Xmodem protocols over the years: the first was to replace the simple checksum on data blocks with a CRC protocol. This is a more complex and accurate test for data errors. It is claimed that the CRC protocol will detect virtually all short data errors and over 99.99 per cent of longer errors. Other improvements to Xmodem include Ymodem windowed Xmodem and Zmodem; more about these shortly.

There is a number of other transfer protocols that you will come across. Most terminal programs have a proprietary transfer protocol included (Crosstalk and Hayes' Smartcom are examples), but I won't cover these here as the details are usually not published. Normally you need to have the same software at both ends of a transfer if you want to use them.

An added complication is that most file-transfer protocols require the full eight bits of each byte of data (so that program files can be transferred). Some online systems such as Viatel and normal PSS only allow seven bits for data, the eighth being reserved for a parity bit (a crude error-checking device). All the Xmodem family and most proprietary file-transfer protocols need eight bits with no parity bit. Some protocols, like Kermit and the CET

Protocol:	Xmodem	YM-k	YM-g	Zmodem	SKermit	WXmodem
Protocol Round Trips	804	104	5	5	5	4
Trip Time at 40ms	32s	4s	0	0	0	0
Trip Time at 5s	4020s	520s	25s	25s	25s	20
Overhead Characters	4803	603	503	3600	38280	8000
Transfer Time at 0s	893s	858s	857s	883s	1172s	916s
Transfer Time at 5s	925s	862s	857s	883s	1172s	916s
Transfer Time at 5s	5766s	1378s	882s	918s	1197s	936s

For comparison: a straight 'dump' of the file contents with no file management or error-checking takes 853 seconds.

Table 1 Theoretical timings for file transfer using several common protocols (assumes no errors, and is based on 102,400byte binary file of random 8-bit characters. Sent at 1200 bits/sec. Ignores I/O overheads)

Protocol	Time/HD	Time/FD	Throughput	Efficiency
Kermit	1:49	2:03	327	34%
Xmodem	1:20	1:44	343	36%
Zmodem	:39	:48	915	95%

Times were measured downloading a 35721-character text file at 9600bps, from Santa Cruz SysV2.1.2 Xenix on a 9MHz IBM PC/AT to DOS 2.1 on an IBM PC. Xenix was in multi-user mode but otherwise idle. Transfer times to PC hard disk and floppy disk destinations are shown.

Source
The ZMODEM Asynchronous Inter Application File Transfer Protocol by Chuck Forsberg (Nov 1986). Published electronically on several systems.

Table 2 Real example of file downloaded from a timesharing system

MCA Micron Computers (Australia)

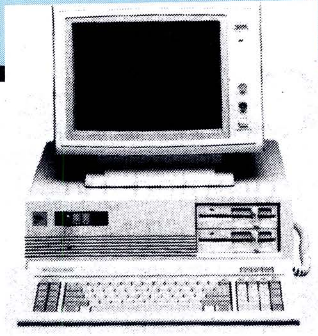
75 IRVING STREET
FOOTSCRAY 3011
VICTORIA
AUSTRALIA
(03) 689 6444 (3 lines)

FINEST IBM COMPATIBLE SYSTEMS

★★★ ALL SYSTEMS WITH 12 MONTH WARRANTY ★★★

★★★ FINE JAPANESE BOARDS ★★★

631 GLENHUNTLY ROAD
STH. CAULFIELD 3162
VICTORIA
AUSTRALIA
(03) 528 6692
FAX: 523 8555



DISK STORAGE
HOLDS 100 DISKS
$20.00

LOOK AT THIS Z-NIX MOUSE
ONLY $115
NORMALLY $140

20 MEG. HARD DISK
****SPECIAL****
ONLY $695
A $200 discount off our R.R.P. of $895 with purchase of a computer system.

THE MICRON PACKAGE DEAL OF THE YEAR

ALL YOUR COMPUTING NEEDS IN ONE NEAT PACKAGE.

Includes

MICRON TURBO PC/XT
- 640K RAM on board, finest quality
- JAPANESE boards
- Dual Japanese Floppy Drives
- Serial, Parallel & Games Port (Second Serial opt.)
- Superb Key Keyboard (AT Style)
- Massive 165 Watt Power Supply
- Real Time Clock & Calendar

MONITOR
A superb SAMSUNG monitor on a tilt swivel base. Your CHOICE of GREEN or AMBER (Composite).

PRINTER
Our Package includes the magnificent OLYMPIA NP165 printer with NLQ and all superb features that go with this famous printer.

ZNIX MOUSE
The best known mouse to any computer the ZNIX mouse is also included in the package.

ALL THIS FOR AN INCREDIBLE $1950

$1195

- 640K RAM ON MOTHERBOARD
- 8088-2 PROCESSOR
- PROVISION FOR 8087-2 CO-PROCESSOR
- 8 EXPANSION SLOTS • 7 FREE
- 2 360K DOUBLE SIDED DISK DRIVES
- CENTRONICS PARALLEL SERIAL (second optional), GAMES PORTS
- REAL TIME CLOCK CALENDAR, BATTERY BACK-UP
- AT STYLE KEYBOARD
- 150 WATT POWER SUPPLY
- RESET BUTTON
- KEYBOARD LOCK
- TURBO SWITCH
- RGB COLOR, COLOR COMP *TTL MONOCHROME AS STANDARD
- FULL 12 MONTH WRITTEN WARRANTY ON PARTS/LABOUR

PHC-1602

5.25" Floppy Disk Drives
Amber Gaslit Display
Less than 6 Kgs

ONLY $2395

MONITORS

Composite	$190
TTL	$195
Taxan Vision III	$690
Fujitech Color	$475
Taxan Vision IV	Call
Thomson	Call

Many Many Many More
Call Us for Price

PRINTERS

Olympia NP 165	$480
Super 5 EP 1201	$520
Epson LX 86	$480
Epson LX 800	$525
Promas 15" Printer	$720
Canon A40	$450

Others
Call for Very Low Prices

PERIPHERAL CARDS

2 Mb. Ram Card 0K Ram	$200
E.G.A. Card	$390
Copy Card & Software	$150
TTL Mon./Printer Card	$170
Color Graphics Card	$120
Turbo Motherboard 4.77/8 MHz 0K RAM	$250
Disk Multi I/O Card	$180
National Disk Drive	$250
Serial Card 2 Ports	$75
Ten Plus Card	$250

WOW!
SPECIAL
5¼" DISKS
SINGLE SIDED
$15
DOUBLE SIDED
$20
BEAT THAT

WE STOCK MANY REFERENCE MANUALS $CALL US

MAIL ORDER NOW!
Call direct! Call today!
***DELIVERY AUSTRALIA WIDE**

All Prices Include Sales Tax

- *IBM is a Registered Trademark of International Business Machines.*
- *Prices and specifications subject to change*

MASTERCARD/BANKCARD /VISA ACCEPTED

* CALL MICRON FOR A DEALER NEAREST YOU

Tele-software format (as used by Microtex), use special methods to send programs over a 7-bit links.

One of the variables in file-transfer protocols is the size of the block of data that is being transmitted. This is a compromise as larger blocks make for a more efficient transfer because the overheads of checking the data and acknowledging the receipt need to be carried out less often. However, the larger the block, the more chance there is of its being corrupted in transit. I have found that, on even a moderately noisy line, it can be virtually impossible to transfer a 1k block without it being affected. I believe that Ymodem, which uses 1k blocks, is supposed to fall back to 128byte blocks if this proves to be a problem, but it certainly didn't happen with the implementation I tried. (I had to revert, manually, to Xmodem to upload a short file to a bulletin board.)

The other factor which governs the efficiency of the transfer process is the fact that many protocols are half duplex: that is, they send a block, wait for it to be acknowledged and then send the next block. There is obviously a short delay while this happens: the minimum has been quoted as 40 milliseconds. This is enough for the delays in the modems and time for the respective computers to calculate the checksums, and so on. It isn't a lot if you are sending a 100k file in 18byte blocks where the total delay will be in the order of half a minute.

The problems begin when you are using a timesharing system, packet networks or a long-distance telephone link that travels via a satellite. A satellite link can add half a second to the round trip time needed to acknowledge each block. The total overhead then increases to around 200 seconds. Packet-switched networks can increase the delay to around a second, and a busy timesharing system can easily generate a total of five seconds or more as you wait for the mainframe to get around to dealing with your particular task. You can image the result in an Xmodem transfer!

In an attempt to improve the efficiency of file transfer protocols when using slower mediums, full-duplex protocols such as Super-Kermit, WXmodem and Zmodem have been devised. In these, the sending system doesn't wait for the block to be acknowledged, but carries on to the next one without delay. If an error arises then the receiving system will tell the sender. By this time it will probably be a block or two ahead, but it either re-sends the bad block and continues where it left off (Super-Kermit) or goes back to the block where the error occurred and starts again (WXmodem and Zmodem).

The latter system is less efficient but much easier to handle from a programming point of view. The full-duplex protocols are often referred to as 'windowed' protocols, as they look at the data as if it were through a window covering several blocks.

Table 1 gives the total overheads calculated by the developers of Zmodem for transferring a 100k file at 1200 bit/sec with 0, 40ms and 5 second delays for various protocols. The figures assume *no* transmission errors. As you can see, windowing makes a very significant difference when delays in the process are introduced.

Xmodem: often called Christensen or CP/M modem protocols. This uses 128byte blocks and a checksum for error-checking. Uses eight data bits to transfer binary files. Supported by just about every terminal program and bulletin board system; also by American commercial online systems such as The Source and CompuServe.

Xmodem-CRC: identical to the checksum system but uses a CRC method of error-checking. Also widely supported.

Xmodem-1k: as Xmodem but supports 1kbyte as well as 128byte blocks. Rarely used.

Modem-7: a variation of Xmodem that transfers a CP/M-style file name with the file. Can be used for batch file tranfers. In some CP/M public domain programs such as MODEM7xx.COM itself.

Ymodem: based on Xmodem. Supports 1k and 128byte blocks, CRC error-checking. Includes filename for batch transfers. Gaining wider support in software of American origin; for example, Procomm, Mirror (MS-DOS), YAM and IMP (for CP/M systems), also BBS systems such as TBBS and Fido.

Ymodem-g: a variant of Ymodem designed for use with hard-wired systems, or systems where no errors are likely to arise (using ARQ modems, for example). No checking of block is performed.

WXmodem: Windowed Xmodem — a full-duplex version of Xmodem. It allows blocks to be sent in a continuous stream with no delays for acknowledging them. Not very common as yet (included in Procomm, the US online system called PeopleLink and reported to be coming on CompuServe).

Zmodem: a more sophisticated variant of Xmodem. It supports longer blocks (typically 256bytes at up to 2400 bits/sec, 1024 bytes above). It also supports batch file transfers, allowing pathnames, including file-creation dates. Includes sophisticated protection against errors interfering with the file-transfer process itself. Looks very promising but very recent and not yet widely used — Zcomm, ProYAM are examples of implementations.

Kermit: designed to allow transfer of files of any type between mainframe systems. It uses a 'quoting' system to allow transfer of binary files on systems that only allow seven data bits. Mainly found on mainframe systems but also some micro-based bulletin boards and terminal packages. Latest version uses windowing to speed up transfer. Widely available in specific micro and mainframe packages, usually public domain. Also in commercial packages such as Crosstalk, Mirror, Procomm, also Fido BBSs.

Super Kermit: a windowed version of Kermit. Still very new. Available in Procomm and on The Source. Terminal packages should be available from usual sources.

CET Telesoftware: a special protocol for transferring program files to and from viewdata systems such as Viatel.

All the above protocols are public domain — that is, the descriptions are publicly available and anyone can use them without the need to enter into agreements or pay any licence fees. Many other protocols exist, but are usually specific to some manufacturer's product. Some are available in a number of products where they have been licensed by others. The following is available in more than one product:

MNP: ARQ system found in a number of error-correcting modems in the USA. Devised by Microcom Networking Products. Available in modems from a number of US manufacturers such as US Robotics, Microcom, Racal-Vadic, Micom.

Table 3 Common file transfer protocols

Conclusion

The field of file transmission protocols

//Micro//Mania

Inboard 386-AT **$3222**	DAC Accounting **$230**	Smartmodem 1200 **$666**	Above Disc **$290**	Miniscribe 44Mb Disk **$1,799**	NEC P7 **$1,137**

SOFTWARE

Above Disc	290.00
Access	439.00
Ancient Art of War	80.00
Async	63.00
Auditor Version 3	216.00
C Compiler – MS	829.00
Carbon Copy	420.00
Chart	499.00
Chartmaster	625.00
Chartstar	261.00
Clickart HP Laserjet Option	260.00
Clickart Laserwriter Option	260.00
Clickart Personal Publisher	295.00
Cobol Compiler – MS	1139.00
Cobol Toolkit	650.00
Concurrent PC DOS for IBM – Ver 5.0	610.00
Copy II PC	91.00
Copy II PC Option Board	249.00
Copywrite	98.00
Crosstalk XVI	199.00
DAC Accounting Aust. Ver.	**230.00**
DAC Word	139.00
DESQview	159.00
DS Backup Plus	180.00
Dac Easy Database System	139.00
Dataflex	1590.00
Daybook – Accounting Cashbook	169.00
Dbase II	750.00
Dbase III Plus	**875.00**
Dbase III Plus Lan Pack	1480.00
Diagram – Master	651.00
Disk Manager – surpass 33MB limit	225.00
Disk Optimizer	95.00
Dos Lock	150.00
Double Dos	95.00
Enter – Full Accounting System	**449.00**
Expert System Handbook	42.00
Fastback	179.00
Fastgraphs	390.00
First Choice	275.00
Flashcode	269.00
Flashup Windows	145.00
Flight Simulator	105.00
Formeasy Desktop Publisher	990.00
Formtool – Forms Design	255.00
Fortran Compiler – MS	620.00
Framework II	1195.00
Freelance	788.00
Graphwriter	930.00
H/Hikers Guide to Gal	80.00
HAL	270.00
Harvard Presentation Graphics	595.00
Harvard Professional Publisher	1349.00
Harvard Project Manager	725.00
Hot	175.00
IBM PC Story Board	515.00
Javelin	1277.00
Jet	102.00
Keyworks	148.00
Kings Quest	90.00
Norton Commander	120.00
Norton Utilities	134.00
Nortons Editor	208.00
Open Access II	1090.00
Pagemaker	Call
Pascal Compiler – MS	479.00
PC Tools	104.00
PC Tutorial	90.00
Perspective – 3D Business Graphics	560.00
Postcode	49.00

"We started Micromania to give you the highest quality service at Australia's lowest prices."
— Mandy Polgar & Garry Visontay

Knowledgeman	919.00
Lotus 1-2-3	**639.00**
Mace – Utility program	169.00
Microsoft Macro Assembler	350.00
Microsoft Project Version 2.0	665.00
Mirror – Crosstalk clone	95.00
Multimate 3.31	639.00
Multimate Advantage	884.00
Multimate Graphlink	214.00
Multimate Local Area Network	1588.00
Multiplan	350.00
Printworks	145.00
Pro Design II	599.00
Professional File	390.00
Professional Write	336.00
Q & A	629.00
Quality Analyst	670.00
Quick Basic	175.00
Rapid File	**572.00**
Rbase 5000	830.00
Referee	119.00
Reflex – Version 1.1	230.00
Remote	227.00
SMART (Lan System)	2183.00
SPSS/PC Advanced Stats	1015.00
SPSS/PC Tables	1015.00
SPSS/PC+	1882.00
Sargon III	100.00
Sidekick (protected version)	78.00
Sidekick (unprotected version)	135.00
Sideways	138.00
Sign-Master	442.00
Smart Package	1199.00
Smartkey	68.00
Smartstuff	91.00
Software Carousel	95.00
Spellbinder	695.00
Spotlight	139.00
Statpak	669.00
Superkey	115.00
Superproject Plus	750.00
Superwriter	377.00
Symphony	**870.00**
TAS+ Database System	210.00
TK solver!	483.00
Timeline	699.00
Turbo Asynch Plus	255.00
Turbo Database Toolbox	124.00
Turbo Editor Toolbox	124.00
Turbo Gameworks	124.00
Turbo Lightning (Vol. 1)	165.00
Turbo Lightning (Vol. 2 – Word Wizard)	129.00
Turbo Pascal Graphix Toolbox	124.00
Turbo Pascal including BCD & 8087	**165.00**
Turbo Power Tools	255.00
Turbo Prolog	165.00
Turbo Tutor	75.00
Twin – 123 Lookalike	242.00
Typequick	83.00
Ventura Desktop Publisher	1549.00
Windows	199.00
Windows Plus Mouse	505.00
Wizardry	103.00
Word + Mouse Version 3	980.00
Word – Version 3	680.00
Word Wizard	120.00
Wordperfect	652.00
Wordstar	405.00
Wordstar 2000	475.00
Wordstar 2000+	577.00
Wordstar Professional	574.00
Xtree – File & Directory Management	99.00

NEC P6 **$899**	TAS + Database **$210**	Enter Accounting **$449**	LOTUS 1-2-3 **$639**	Seagate 20Mb Hard Disk Kit **$825**	Irwin 20 Meg Backup-XT **$1,299**

STAR PRINTERS
JUNE SPECIALS !!

Star NL10	$460
Star NX10	$478
Star NR15	$1,152
Star NX15	$778
Star NB15	$1,656

EPSON
OUT THEY GO !!!

Epson LX-86	$479	Epson HI-80	$676
Epson EX-800	$936	Epson JX-80	$884
Epson EX-1000	$1220	Epson LQ-1000	$1287
Epson FX-1000	$993	Epson LQ-800	$936
Epson FX-800	$794	Epson RV-100	$1455
Epson GX-80	$407	Epson SQ-2000	$1795

NEC Computers We're No. 1 on low low prices

NEC Multispeed portable lap top	$2,849
Powermate – Dual EGA Graphics	$4,550
Powermate – 20 Meg EGA Graphics	$5,290
Powermate – 20 Meg Professional Graphics	$6,844

MicroMania

Miniscribe 71Mb Disk **$2,325**	TVM EGA Monitor **$999**	Power Supply 135W **$199**	EPSON LX86 **$479**	Hyperace 10 Meg Speed Card **$999**	Hercules Graphics Plus **$550**

PRINTERS

Brother 1509	867.00
Brother HR20 Daisy Wheel	888.00
Brother HR10	517.00
Brother HR15XL	679.00
Brother HR35	1454.00
Brother M1109	472.00
Brother M1109 for Apple incl. Tractor	575.00
Brother M1409	775.00
Brother M1709	1159.00
Brother M2024L	1550.00
Brother Twinwriter	2359.00
Epson EX-800 Printer	936.00
Epson LX86	479.00
Epson FX800	794.00
Epson GX80	407.00
Epson LQ1000	1287.00
Epson FX1000	993.00
NEC P5 Pinwriter	1699.00
NEC P6 Printer	899.00
NEC P7 Printer	1137.00

MODEMS

Netcomm 1200 In Modem	**618.00**
Netcomm 123 In Modem	846.00
Netcomm 1234 In Modem	1048.00
Netcomm 21/23 Modem	503.00
Netcomm 2400 In Modem	834.00
Netcomm 3 + 12 Automodem	419.00
Netcomm 3 + 12 Manual	254.00
Netcomm PC In Modem	450.00
Netcomm Smart Modem 1200	666.00

HARDWARE

41256 RAM Chip (256k)	6.90
4164 RAM Chip (64k)	3.33
80287-6 AT Maths Coprocessor	465.00
80287-8 AT Maths Coprocessor	799.00
8087 Maths Coprocessor	324.00
8087-2 Maths Coprocessor	425.00
AST – Sixpak Plus + Desqview	**350.00**
AST Advantage – AT W/128K	950.00
AST Four Port/Xenix	865.00
AST Fourport/AT	595.00
AST Preview PC/XT/AT Mono Graphics	445.00
AST Rampage – 256K PC/XT + Desqview	639.00
AST Rampage – 512K AT/Desqview	1195.00

The lowest KAYPRO and OSBORNE prices !!

Kaypro PC $2,199
768k, Dual Drive, Turbo, Bugboard, Free Software

Kaypro PC20 .... $2,599
768k, 1 Drive, 20 Meg, Turbo, Free Software

Kaypro PC30 .... $2,799
768k, 1 Drive, 30 Meg, Turbo, Free Software

Osborne Graduate PC $1,299
256k, Dual Drive, Turbo, Graphics card, Printer port

Osborne Graduate PC20 . $2,199
256k, 1 Drive, 20 Meg, Turbo, Graphics Card

Osborne Turbo Executive . $2,999
1 Meg RAM, 1 Drive, 20 Meg, Ser/Par/Clock/DOS 3.2, Turbo/Graphics

ADI – IBM TTL Monitor – Amber	285.00
ADI – IBM TTL Monitor – Green	285.00
ADI EGA Monitor	899.00
TVM EGA Hi Res Col/Monitor (MD-7)	**999.00**
EGA Compatible Card	**490.00**
EGA Autoswitching Card	**549.00**
ATI EGA Wonder – incredible!	**699.00**
ATI Graphic Solution	459.00
Hercules Graphics Card Plus	550.00
Intel Above Board – AT	1012.00
Intel Above Board – AT/PS Par/Ser	1125.00
Intel Above Board – PC/XT	**690.00**
Intel Above Board – Par/Ser PC/XT	765.00
Joystick – IBM PC with cable	49.00
Logitech Mouse	210.00
Microsoft Mouse (Bus)	284.00
Microsoft Mouse (Serial)	284.00
PC – Multifunction Card – 384K	195.00
PC Bugboard – Mono/Colour/Hercules	339.00
PC Colour Graphics Card	159.00
PC Colour/Mono/Graphics Card	230.00
PC Floppy Disk Controller	114.00
PC Memory Card – 640K	**130.00**
PC Mono Text Card	185.00
PC Mono/Graphics Card	199.00
PC Multi I-O Card	195.00
PC Parallel Card	80.00
PC Serial Card	80.00
Paradise Colour/Mono Card	374.00
Paradise Modular Graphics Card II	594.00
Parallel Printer Cable – PC	35.00
Power Supply (135w)	199.00
Printer Buffer – 256K Parallel	**429.00**
Thomson EGA Monitor	1099.00
Thomson IBM TTL Amber	280.00
Thomson IBM TTL Green	280.00
Thomson Colour – 36512	710.00
Thomson Colour – 31382	820.00
Floppy Disk Drive – PC 1/2 height	199.00
Floppy Disk Drive Teac – 1.2 Meg	370.00
Archive 60 Meg Internal Tape	**1495.00**
Easyfix 20Meg Card	**1035.00**
Easyfix 30Meg Card	**1410.00**
Irwin 110D 10 Meg Tape B/Up – XT	1190.00
Irwin 120D 20 Meg Tape B/Up – XT	**1299.00**
Miniscribe – 71 Meg Hard Disk	2325.00
Miniscribe 44 Meg F/H Hard Disk	1799.00
Seagate 20Mb Hard Disk Kit	825.00
Seagate 30Meg XT Drive Only	824.00
Seagate 30Meg Full Height AT Drive	1479.00
Seagate 30Meg Hard Disk Kit	**1160.00**

STAR NX10 **$478**	Archive 60Meg Tape B/Up **$1,495**	Freedom 1 Terminal **$999**	ATI EGA WONDER **$699**	Doslock – Hard Disk security **$149**	640K Memory Card – OK **$130**

OUR HARD DISK PRICES HAVE CRASHED!!

Seagate 20 Meg Kit	$825
Miniscribe 44 Meg – 28 m sec AT Drive	$1,799
Miniscribe 71 Meg – 28 m sec AT Drive	$2,325
Easyfix 20 Meg Hardcard	$1,035

Australia's leading PC discounters

(02) 569 0232

180 Parramatta Rd, Stanmore N.S.W. 2048

All prices include sales tax. We accept Bankcard, Mastercard and Visa. We have the largest range of PC products in Australia. Call us for a quote and a free catalogue-newsletter. All products carry full distributor's warranty and support and are latest release versions. Delivery extra – call for rates. Prices may change due to factors beyond our control. We ship Australia-wide.

Dear Christine,

I want to become a Micromaniac today! I wish to:

☐ receive your latest newsletter and catalog with over 600 products listed.

☐ be placed on your mailing list to be kept regularly up to date with latest product releases and special offers.

Name ....

Company ....

Address ....

.... Postcode ....

My computer is ....

Send to: Christine, Micromania, 180 Parramatta Rd, Stanmore, NSW 2048

is large and complex, and I haven't been able to do much more than scratch the surface here. I hope that I have at least given you some understanding of what goes on when an error-correcting file transfer system is in use and also what some of the more common systems are.

Some bulletin boards carry downloadable text files that contain the full specification of Xmodem and other protocols. Look through your local boards if you want to get hold of this information.

Telgraf

Those who doubted the ability of Telgraf to make good its promises (Communications, April 1987) have been vindicated. *Computing Australia* has reported that Adam King, Telgraf's managing director has disappeared leaving a trail of debts — as much as $300,000 according to one source.

Telecom charges

After months of speculation and rumours, Telecom has come clean on the matter of timed local data calls. Legal and policy manager, Jim Holmes reportedly stated that computer calls will be charged on a time basis from mid-1988, ostensibly to reduce congestion on the network. The originator of the call will be charged the local call fee (as presently applies) while the receiver will be charged for the duration of the call. The charges have not been fixed, but Dedicated Services' manager, David Gannon suggested $3 per hour during business hours and $1 per hour at other times could be taken as a guide.

Since Telecom has been forcing BBS operators to agree to classification as business computers, it is hard to see how bulletin boards will be exempted for these charges. The most likely result will be that many systems will close down for good. Following discussions with Telecom, Max Moore has decided that his Mail-Bus system will close on May 1, 1988 in anticipation of the new charges.

Telecom's defence of timed local data calls in last month's Letters column ignored the fact that the bulk of BBS use is off-peak, which means that otherwise unused circuits are employed. Clearly, the marginal cost of an off-peak call is virtually zero. It seems reasonable that those who use the network at peak times should face charges that reflect the cost of providing it — they are the customers that determine the size and complexity of the system. However, I can see no reason why local calls (voice or data) should be timed during off-peak periods, as this will further reduce utilisation during evenings and weekends.

Modem approvals

Changes to the regulations concerning modem approval mean that automatic re-dialling has been severely restricted. New designs will only be approved if they limit attempts to connect to a particular number to five in a 30 minute period. I understand that this limitation on automatic dialling has been around for some time, and the change in the approval rules merely makes it harder to ignore.

Fido

About a year ago, I offered to make copies of the Fido software for would-be sysops. I am no longer able to provide this service, so no more disks, please.

Software connection

Graeme Nichols of the Software Connection has drawn attention to some attractive features offered by his board. Access is completely free, and there is no delay caused by the registration process. New users simply complete a short questionnaire to get full access to the system, including software downloading and Australia-wide mail (FidoNet node 711/404).

The system also offers a selection of on-line puzzles and games including several adventures. Players can save the game position before they log off, and pick up the threads later.

In case you missed the details in the April issue, Software Connection is available 24 hours daily on (02) 451 2954. Modem standards are V21, V22, V22bis, and V23.

System news

Bill Bolton has managed another first by installing a Trailblazer 9600 baud modem in his Software Tools system. You can still get in at the 'slow' speeds of 1200 and 2400 bps, though.

Microsoft has started to offer a technical support service through Bill's system, so if you are a serious user of Microsoft products it might be worth checking it out. It is planning a similar service on a Melbourne board, so watch for more details at a later date. Bear in mind that Software Tools is on FidoNet, so you might not need to incur STD charges when contacting Microsoft.

Thanks to the following people for providing information this month: Ross Kellaway, Larry Lewis, Rupert Russell, and Daron Ryan.

New systems

NSW

AED-Prophet (02) 628 5222. MV. Larry Lewis. 24 hours daily. V21, V22, V22bis, V23.
Club Amiga (02) 521 6338. MV. Ross Kellaway. 24 hours daily. V21, V22. Amiga and C64.
Dymock's Computer Bookline (02) 232 3061. MV. Bob Green. 10am-8.30pm weekdays, 24 hours weekends. V21, V22, V23.

ACT

ACT Pharmacy (062) 92 3875. Michael Pye. FidoNet 626/223.

Vic

Melbourne Data Exchange (03) 560 6556. Robert Brooomhead. V21, V22, V23. FidoNet 631/321.
Silicon Valley (03) 427 0297. 24 hours daily. V22 only; V22bis only on (03) 427 0306. Use VT100/ANSI terminal emulation.

Qld

Ozforum (07) 209 4294. M. Greg Noonan and Dirk Vanbruggen. 5pm-7am weekdays, 24 hours weekends.

SA

IDN (08) 352 2252. MV. Dave Winfield. 5.30pm-9am weekdays, 24 hours weekends. V21, V22.
Trivia (08) 377 0049. Daron Ryan. 6pm-8am weekdays, 2pm Saturday-8am Monday.

Updates

NSW

Arco-Tel (02) 683 3956. MV. Alex Szx. 24 hours daily. V21, V22, V22bis, V23.
Books (02) 525 5781. P. Chris Ruwoldt. 24 hours daily. V21, V22, V22bis, V23. FidoNet node 712/503.
Club Mac (02) 73 1992. MV. Jason Haines. 24 hours daily. V21, V22, V22bis, V23.
Dungeons and Modems Off-line.

COMMUNICATIONS

Manly (02) 977 6820. MV. Chris Patten. Requires Rterm or Ultraterm on C64.
NABA-Prophet (02) 628 7030. MV. Larry Lewis. 24 hours daily. V21, V22, V22bis. FidoNet 712/606.
Paragon (02) 597 7007. MV. Jennifer Allen. 24 hours daily. V21, V22, V22bis, V23. FidoNet 712/502.
Software Tools (02) 449 2618. MV. Bill Bolton. 24 hours daily. V22, V22bis, Trailblazer 9600 only. FidoNet 711/403.
Tube Line Off-line.

ACT

Gateway (062) 88 0024. P. James Collins. 24 hours daily. V21, V22, V23.

Vic

AUSOM (03) 877 1990. P. Grahame Willis. 24 hours daily.
Down Under Software #1 (03) 429 8079. P. Greg Hudson. 24 hours daily. V21, V22, V22bis, V23. FidoNet 630/307.
Down Under Software #2 (03) 429 5819. P. Greg Hudson. 24 hours daily. V21, V22, V22bis, V23. FidoNet 630/306.
Eastcom (03) 288 0775. P. Maurice Halkier. FidoNet 630/312.
Info-Source (03) 397 1165. MV. Clement Maloney. 24 hours daily. V21, V22, V22bis, V23, Bell 103 & 212A. FidoNet (soon).
Magic Pudding (03) 428 2178. P. Rupert Russell. 24 hours daily. V21, V22, V23 (Nice Modem II).
National (03) 25 6904. P. John Blackett-Smith. 24 hours daily. V21, V22, V22bis. FidoNet 630/301.
Motel International Off-line
PC Domain (03) 789 8918. P. Daryl Clayton. 24 hours daily. V21, V22, V22bis, V23. FidoNet 630/320.
PC Oasis #1 Off-line.
Sam's (03) 563 1117. P. Alan Haslar. 24 hours daily. V21, V22, V22bis, V23. FidoNet 630/305.

Qld

Datanet Off-line.
Hotline Off-line.
Kangaroo Point TAFE Off-line.

END

VERSIONS:MS/PC DOS, AMIGA (M68000) - $300
UNIX/ZENIX MULTI-USER - $1,495
Manufactured in Australia Ph (02) 816 3700
Enquiries welcome for retail, wholesale bundling.

This Advertisement is a reprint of the April Screentest of Vers. 3.2 footnotes have been added where Vers. 3.8 has been enhanced.

Able One

Cheap, fully integrated packages seem to be the order of the day for novice or budget conscious buyers. Kester Cranswick gives Able One the once over.

We all recall the furore which greeted the first integrated software packages. Pay $1000 or more and you could get a single package that incorporated a word processor, spreadsheet, database, communications and possibly a graphics component. Such packages were ideal for the novice user who was short on a few dollars and could not afford to buy a suite of full-featured packages. They were ideal, too, for the executive who wanted to avoid the hassle of swapping disks to change applications and who did not need the power of single purpose applications.

But there were criticisms. The integrated software offered modules that were simplistic in their approach, and lacked the features of the custom applications.

There were two solutions. Firstly, go the custom application route and spend lots of money getting powerful programs which you might eventually grow into. Secondly, get integrated software down to a price that reflected the relative unsophistication of the genre.

In February *APC* we looked at a package called Ability, a $318 package that offered modest power at a modest price. It was heartily recommended. It is not alone in the market, and this time it is the turn of Able One.

Able One is also from the US, being developed by a company called International Inc. The package includes word processing, spreadsheet, database, communications and graphs modules. It also has the unusual, but desirable feature of being multi-tasking. It's priced at an affordable $300 and distributed by the Sydney-based Able.

For that money you get two disks, an instruction manual and a hard plastic case. You'll need a PC or compatible with 512k memory and two disk drives. (1)

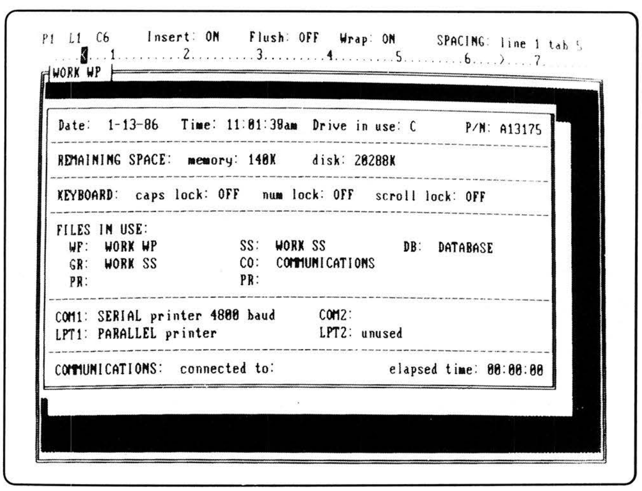


Fig 1: Pressing F10 activates the status window which shows the date and time, time elapsed since Able One was started, drive in use, disk and RAM remaining, files in use, status of caps lock, num lock and scroll lock keys, as well as the port configurations.

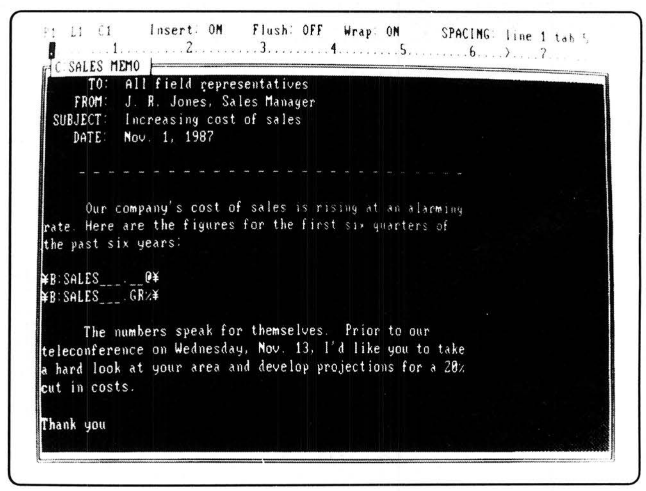


Fig 2: Above the word processing window are two information lines. The first shows the page, column and line locations of the cursor. Then there are indications of whether insert, justification and wordwrap are on or off, plus line spacing and tab settings.

(1)ABLE now requires 1 disk drive, and runs on E.G.A./TTL/RGB/Composite monitors. It requires NO installation for monitor or Hard Disk.

A colour monitor with graphics card would not be missed either.

Getting started

Typing ABLE-1 at an MS-DOS prompt loads the program. The process takes about 40 seconds. After a simple opening program identification, you are presented with a list of possible functions. From the top, the list looks like this: word processing, spreadsheet, database, communications, graphs, backup, restore, utilities, quit and help. All modules are available, regardless of your system configuration.

There is also a window at the top of the screen that reads 'May I help you customer?' That's not very personal, so the first thing to do is to take advantage of the customisation procedure. Type 'name' followed by your name, and your name appears instead of 'customer'. Type 'greeting' followed by a short message, and that message will replace 'May I help you,'.

Colour is limited to the background, command line and task menu. This colour can be changed from the default blue, by entering 'color' and the color by name on the command line. But this will change the background colour only. Entering a number from 00 to 99 after 'color' gives a full range of background and foreground colour options, complete with flashing and inverse video. Colour is used in only a few of the modules, chiefly the spreadsheet.

The command line also features a primitive, English interface. With a dictionary of 19 words, Able One can be told to start a task with commands such as 'talk' (communications), 'memo' (wp), 'print' and 'help'. It's a bit of a gimmick, but who said Americans don't go for gimmicks.

This task window can be called from any task with the F7 key. In fact, the function keys are what give Able One much of its versatility.

F1 is the usual key for help. A context-sensitive help screen appears on screen, the text depending on the task. Each section gives a reference to the manual, but it is possible to figure out what's going on without the manual. You can also edit any help files, with the word processor.

F2 brings up a simple one-line calculator giving add, multiply, subtract and divide functions. Numbers are displayed as keyed in; Return gives the result.

In all tasks, F3 is the save file option. The existing file name is given, or a default name if the file is new. Accept or change the name, press Enter, the task is suspended as the file is saved, and then it's back to work again.

To print a file, any file, from within any application, press the F4 key. Two files can be printed separately, and as background to another task, but more of that later. More of the communications module, accessed by a press of the F5 key, later too.

From the tasks menu, the F6 key is most likely to be used, as it displays a list of files on the current drive, against a coloured background. Selecting a file with the cursor opens that file and the application associated with it. If you are already in an application, you will be prompted to save the current file before proceeding. Pressing the F7 key brings up the opening tasks menu. You might use this to start a new file in a task, though you'll find F8 is a more useful key. It brings up a coloured list of windows that have been opened.

> *'As with other tasks, the spreadsheet has a link feature, so data from other files can be referenced by a cell.'*

There will always be four windows in the list, default files for word processor, spreadsheet, database and communications. In addition, there will be windows for any other files active. Selecting the relevant window brings it to the foreground. If it is less than full screen in size, and windows are easily resized, other windows will still be visible in the background.

In all tasks, F9 is the options menu, the options depending on what application is being used. The options overflow the window space, so cursor keys are used to move up and down the list.

Finally, F10 brings up a status screen, again on a coloured background. It shows the date and time, time elapsed since Able One was started, drive in use, disk and RAM space remaining, files in use, status of caps lock, num lock and scroll lock keys, as well as the port configurations.

Word processing

Word processing is the key component of Able One, as besides being the means of writing documents like this, it also provides the output for database reports, can incorporate spreadsheet figures, charts and create documents to be sent electronically.

It is stacked full of features, at least on paper. The most exciting attraction is a spelling checker, something that certainly gives Able One an edge over arch-rival Ability.

Other features include a good range of formatting commands, the ability to print out two files, while working on a third, a mail merge facility, cut and paste commands and the ability to store deleted text in a linked file.

When a word processing file is started, a screen-size window is opened. This can be resized, a corner at a time and with the options menu. The name of the file is shown at the top of the window area.

Above that are two information lines. The first shows the page, column and line locations of the cursor. Then there are indications of whether insert, justification and wordwrap are on or off, plus line spacing and tab settings.

Below is a ruler, with margins, tabs and cursor positions indicated. Margins are also shown in the word processing window as block text characters from the edge of the text area to the edge of the window. A thick line indicates a page break. Changes to any setting are done using the options menu, selected with F9. If you are making many format changes, having to call up the options menu and page through the selections each time is trying on the patience. There are no function keys that, for instance, perform a 'go to' or 'find' operation. (2)

Moving within a document can be by the cursor or tab keys, or a find command. Cursor keys move the cursor a character at a time in all four directions. Pg Up and Pg Dn have their stated effects; Home and End go to top and bottom of the document respectively. Ctrl and left or right arrow keys move the cursor a word at a time.

The Find option accepts a string of up to 39 characters and does a non-case specific or exact match on those characters. When a match is found, the option to continue the search is given.

The replace option is similar, though you have to enter a replacement string, again of up to 39 characters, and are given the option of a global replace, or a user verified replace of each matched string. (3a)

Able One is able to keep up with rapid typing except at those times when it saves a block of text to disk. In that case, display pauses for a few seconds, catching up when data storage is complete. It is something you learn to live with.

Deleting and moving text is straightfor-

*(*2) ABLE V3.8: You now have a choice. You can hit e.g.F9/MO to move, F9/CO to copy etc: faster.*
*(*3a) Hit F3 if ABLE is slowing up. This is not such a problem on 'Turbo's or AT's.*

TRAINING WITH A CAPITAL "E"

That's "E" for Education, Experience, Efficiency and Effectiveness.

Most of the Business Colleges that form the authorised training network for the software products of ABLE AUSTRALIA have been involved in the Business Education field since the 1800's. All have a reputation for sound business education. For example, the Williams Business College in Sydney has, since 1894, trained over 100,000 men and women for successful careers in all areas of business and the Public Service.

This success in the education/training area ensures that the time you spend in a course will be time well spent. The courses run by the Colleges are efficient and effective. As a result of their decades of experience, the Colleges understand the needs of businesses and organisations, large and small, and the people associated with them. Courses are educationally sound and very economical - in most cases course fees are a fraction of those charged by other training institutions. The Colleges' reputations ensure that course certificates issued are of value - and if you are going to undertake a training course why not take a training course that provides a recognised certificate.

The Business Colleges listed below offer a range of training courses - from short 1 day training sessions to full time courses. Contact the Colleges directly for more information. From individual "begin at the beginning" courses to specialised small business training and corporate training, you will find them more than ABLE to handle your training needs.

ADELAIDE
PRIDES BUSINESS COLLEGE
75A GRENFELL STREET
ADELAIDE
Ms P. Walsh Telephone 223 1585

CANBERRA
METROPOLITAN BUSINESS COLLEGE
AMDAHL BUILDING
33 AINSLIE AVENUE
CANBERRA
Miss D. Summerhayes 47 0168

NEWCASTLE (NSW)
NEWCASTLE BUSINESS COLLEGE
9 STEEL STREET
NEWCASTLE
Mrs. P. Darcy Telephone 26 1577

BRISBANE
NUNN AND TRIVETT'S COMMERCIAL COLLEGE
MacARTHUR CHAMBERS-7th FLOOR
QUEEN & EDWARD STREET
BRISBANE
Mrs. V. Dommett Telephone 221 8114

SYDNEY
WILLIAMS BUSINESS COLLEGE
CITY BRANCH: 2 BOURKE STREET
SYDNEY
Mr. D. Kelch Telephone 233 3822

BROOKVALE BRANCH: BROOKVALE HOUSE
1A CROSS STREET
Mr. D. Kelch Telephone 938 6899

EPPING BRANCH: 44 LANGSTON PLACE
EPPING
Mr. D. Kelch or Mr. V. Savitsky
Telephone 869 7088

MELBOURNE
HOLMES COMMERCIAL COLLEGE
271 FLINDERS STREET
MELBOURNE
Mr. D. Sholl or Ms K. Warby
Telephone 63 1181

PERTH
AUSTRALIAN BUSINESS COLLEGE
111 ST. GEORGES TERRACE
PERTH
Mr. J. Evans or Mr. J. Goh
Telephone 321 6051

WOLLONGONG (NSW)
WILLIAMS BUSINESS COLLEGE
123 CROWN STREET
WOLLONGONG
Mr. D. Kelch Telephone 29 2944

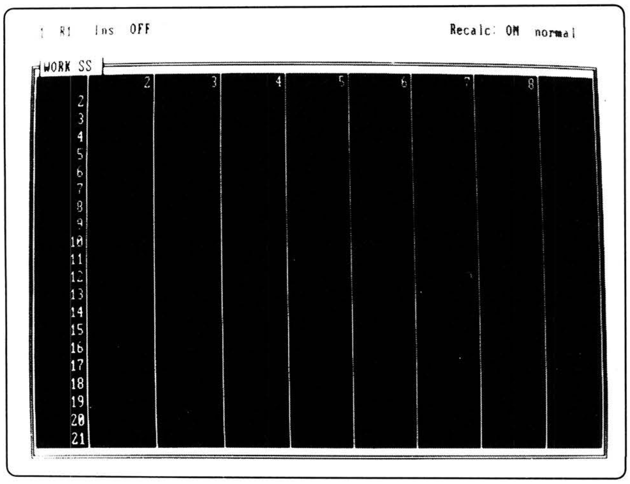


Fig 3: With a 10,000 cell range, the Able One spreadsheet is again an impressive facility. It has charting, colour presentation, iterative calculation, sorting and much more.

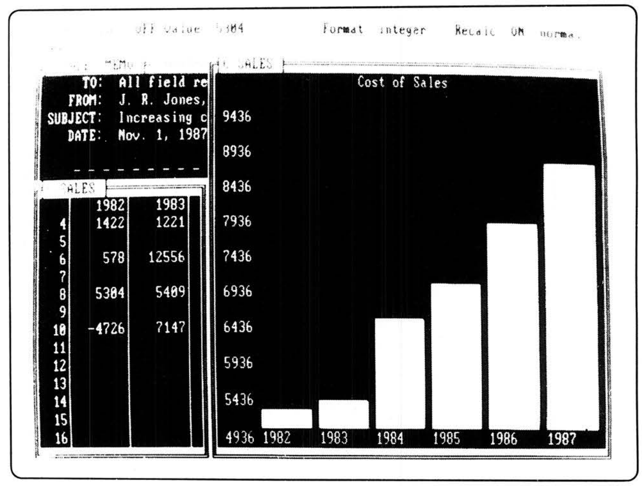


Fig 4: One of the best features of Able One is its ability to run several tasks at once. Switching isn't instantaneous though, but it does enable changes in one file to be immediately reflected in linked files.

ward once you get the hang of it. The backspace key removes one character at a time. Pressing the Del key gets you into a delete mode. The cursor is moved from its present location to the start or the end of the text block to be deleted.

Press the Enter key and the text is saved to disk in a temporary file, and then removed from the screen. Another option will undelete text. When the work file is subsequently saved, a prompt asks if the deleted text should be saved. This is not a feature found on the majority of word processors, and could come in handy for form documents that are often changed.

The procedure for moving or copying blocks of text is similar, with a block being outlined, and the target location selected with the cursor. With copy, however, you can move in text or data from another file, be it spreadsheet, database or another document.

To insert the whole of another document into a word processed file, the attach option is used. The attached text does not appear on the document screen. Rather, positioning the cursor on the file name that does appear, and pressing Enter displays the relevant data.

What this means is that a file can be attached, and when the document is printed, the latest version of that file is incorporated.

Graphs as well as data can be attached to a document. They are not visible on the word processing screen when the Enter key is pressed.

Formatting controls include margin resetting, justified or ragged right text, any amount of line spacing or tab setting, and bold, underlined, superscript or subscript. Two other printer enhancements can be set as well, if you know the relevant ASCII codes.

There is a worrying display problem encountered at times when you use the print format or delete commands. For instance, bold text is meant to appear as white on the grey 'paper', underlined text as purple and so on. What can happen is that the display gets confused, so that normal text appears white, or on-screen line spacing is upset. Once this happens, you really don't know how your document is formatted, and there seems no cure for this, other than quitting the application.(3)

Other options allow a file to be saved as text, for use in other word processors, for the temporary deleted text file to be removed and for lengthy headers and footers to be inserted and displayed. Reformatting is done a paragraph at a time. There is no global reformat command.

Macros can be created easily, and assigned an Alt key. The macros can't be set up to perform option commands though, and are limited to actions that are keyed in. That's a pity, as it would be nice to have a macro that automatically reformats. (4)

The spell checker sounds useful. It checks by paragraph or globally, marking words not in the dictionary. A further option goes through the marked words for correction and optional addition to the dictionary. However, spell checking an entire document is incredibly slow. Half this document took at least five minutes!

For printing, there are some good features. With the F4 key, two documents can be printed in the background, if two printers are attached. Page numbers on paper are optional, and there is a single sheet option. Page width and length settings can be altered and partial documents printed.

To print labels, database reports or do a mail merge, there must be a database. So, let's examine that.

Database

Able One's database is a suprisingly sophisticated affair, featuring relational capabilities, data verification and usage of the word processor as a report generator. You'll need to know a little about database construction to use it, but with help on hand and a little forethought, you'll get by.

First off, work out the fields needed, and their length. Able One sets up fields as alphanumeric, numeric or integer, with each field optionally indexed as a primary or secondary field or unique, so the value can be entered only once. Fields can also be calulated and/or linked to others.

*(*3) ABLE V3.8: Hit Pg Up/Home or F3 [Save] to fix the display. This bug is fixed in V3.9.Upgrades cost only $55.*
*(*4) ABLE V3.8 Hit Alt/B, to reformat a paragraph.*

There is also a master category, used for setting up what the software developers optimistically dub a relational database. The master tag is supported by a transaction record tag. This means that a master file can reference several related entries in another database. It adds a degree of sophistication to the database, but if you are really needing this sort of power, a dedicated database package should be considered.

Data entry templates are drawn up by entering field names and descriptions on screen. Templates can be modified at a later stage. You can also set up a template to allow only certain values to be input in a field, such as a range of account numbers. Templates can be duplicated too.

For calculated fields, numeric values from another database or a spreadsheet can be used. With the windows facility, the source file is called up and the cell or field selected. By the same means, fields can be linked to data outside the database. Whole files can also be attached to a database, with their presence indicated by a marker.

Selected files from another database can be copied into a primary database, ordered according to indices if necessary, and with the opportunity to verify a record before it is added. Text files can also be included, provided they meet field specifications. Conversely, a database can be converted to a text file for word processing, again with ordered, unordered or query options.

For searching, the usual wildcards can be used. Boolean operators plus and/or relationships can be specified. To browse through files, enter no value for the search criteria.

Other facilities include a count of records that match search criteria, and a summing facility that adds numeric values in a selected range of fields. It's all good, useful stuff, belying the expected usefulness of integrated software.

To print a report, a text file must be set up with the word processor. With the report designed, fields are attached to the document, and given any length necessary. A range for an indexed field is specified, and the report can then be printed. Any database updates will be reflected in the report. It's a tedious setting up procedure, but once mastered, quite straightforward.

Spreadsheet

With a 10,000 cell range, the Able One spreadsheet is again an impressive facility. It has charting, colour presentation, iterative calculation, sorting and much more.

Cells can be referenced by labels, derived from column and row headings, absolute or relative co-ordinates or given a name that can be used in formulae.

Within formulae, ranges can be specified, and there is the usual range of mathematical and Boolean operators.

Special functions include those to add a column or row, four statistical functions, mathematical functions and circular referencing. With this last function, a cell value that must be calculated based on another value, but that forms part of that total, can be calculated iteratively, with the number of iterations and the error range being specified. Few spreadsheets of any complexity have this.

As with other tasks, the spreadsheet has a link feature, so data from other files can be referenced by a cell. There is a recalculate feature that can be off or on. The status line indicates the status of recalculation, as well as cell formats and values.

'because Able One is a multi-tasking program, communications can be run as a background to any other task. . .'

With a colour monitor, ranges of cells can be highlighted in a colour selected from the options menu. And, to make a chart is simplicity itself. We'll look at charts next, but suffice to say that choosing a chart option, highlighting a range of cells and pushing the Enter key produces an on-screen chart in a few seconds.

Other features include cell protection, column and row adding or deletion, optional row and column heading display and cell display being centred or justified left or right.

Finally, spreadsheet data can be incorporated into a text document, again by linking the file. It all adds up to a powerful, sophisticated spreadsheet facility.

Graphs

There are three chart options — bar, pie and scatter. Choose the presentation format, select a cell range, verify minimum and maximum ranges, margins and so on. Seconds later, the chart is displayed, and can be saved for printing on a printer or plotter.

The bar chart allows 50 numbers to be charted. When displayed, the spreadsheet is still visible, and altering any values in the spreadsheet instantly updates the chart. The chart remains visible until the bar chart option is reselected.

To get a pie chart, you need a graphics card. Up to 30 values can be plotted, and the chart can be exploded if wanted. You can also choose from a small or large chart, with optional naming of slices.

Scatter charts also require a graphics card. As with pie charts, a scatter chart takes the full display, and can't be updated in the way a bar chart can. It will cope with up to 500 values, in line or point format, and with optional axis headings. Minimum, maximum and axis scale values can be altered from the values suggested by Able One, and there are two chart sizes.

Communications

Though the communications module is available as a task from the opening menu, it can be accessed from any module by pressing the F5 key. Alternatively, any number can be dialled from within another task, using the 'Dial' facility in every option menu. And, because Able One is a multi-tasking program, communications can be run as a background to any other task, with F5 able to display the communications window in a trice.

The only sort of communications that can't be done with Able One are those for Viewdata services such as Viatel. With the growing popularity of such services, it should be an area that integrated software addresses. *(*5)*

Default communications parameters are for a 1200 baud service. Changing defaults is done using the options menu. It's rather tedious as with each parameter change, the options menu disappears, has to be called up and the cursor moved down to the relevant option.

Parameters cover a reasonable range, with baud rates from 75 to 9600 baud, full, half and no duplex and a choice of two serial and four parallel ports.

The options under the remote device are for Hayes, Datec smart modems, manual modems, PC to PC, plus HP7475 plotter (the comms port is used to drive a plotter) and Novation (answers on a postcard, please). The data transfer protocol choices are Xon/Xoff and CTS/RTS.

*(*5) ABLE V3.8 still lacks XMODEM protocols. We hope to have these added when V3.9 is released.*

SCREENTEST

Using the communications module springs no suprises. Incoming text is stored as a text file, and can be used by any of the other Able One modules. The built-in macro facility lets you remember a sequence of commands, so logging onto a frequently used service can be done with a single command. A five second pause can be built into the macro and Able One automatically redials a number until it gets an answer.

Options in the module allow the display of incoming text to be turned off, and incoming hex data to be converted to ASCII or vice versa.

An answer option sets up Able One to respond to an incoming data call, either as a foreground or background task. In the former case, the remote computer takes control of yours. For a background answer facility, select 'answer' from the active module's option menu. When an incoming call is detected, a message appears at the top of the screen, and you press F5 to get into comms.

Multi-tasking

One of the best features of Able One is its ability to run several tasks at once. Switching isn't instantaneous though, but it does enable changes in one file to be immediately reflected in linked files.

Able One achieves what it does by storing all applications in RAM. When a window is called to the foreground, relevant data is called from disk. Data is also written to disk at intervals. Changing to another task involves saving data to disk, reading the new file and getting on with it. With large files, this can be time consuming, but the benefits are worth the hassle.

A niggling problem is that there is no option not to save a file, meaning that you'll have to regularly purge disks of redundant or unwanted files. (6)

With all the possible tasks, files and windows, plus the ever-present options, it is not difficult to get confused about what file you are working on. Fortunately, using the Esc key will undo commands in reverse order, so if you get totally lost, just work back to the opening screen. I managed to hang the system a couple of times, so it is not foolproof. Frequent saving is the order of the day. (7)

To prevent unauthorised access to private files, and/or all fieldsa password can be assigned . A master password lets a user see all passwords assigned to all files. While this is not a high degree of security, it is enough to deter the inquisitive busybodies.

Documentation

With the program you get a 280 page paperback manual and a loose sheet dealing with changing drive designations and using sub-directories. It assumes no computer knowledge on the part of the user and has introductory chapters based on sample files supplied on the master disks. Each module is then covered in detail, followed by a section on customising menus and a brief explanation of the options available in each module. There's an ASCII chart and a glossary of terms too, with the manual concluded by an index. To make the most of Able One, you'll need to study the manual. (8)

Conclusion

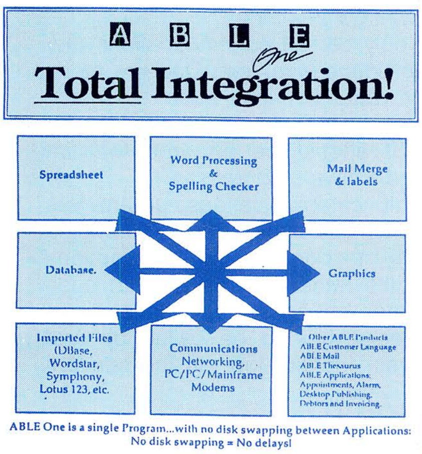
For $300, Able One is an absolute bargain. It has the right range of modules, and their sophistication makes a mockery of the price.

The ability to multi-task and link data is excellent. To be fair, there are times when you feel that the program is not as robust as it should be, but considering all that is crammed in, it is a miracle it works at all.

It may not look as pretty as dedicated packages, and some tasks need a little too much keyboard work, but given the price, Able One is a welcome addition to the PC software ranks. If you need one piece of software to do a multitude of tasks, do give Able One the once over.

END

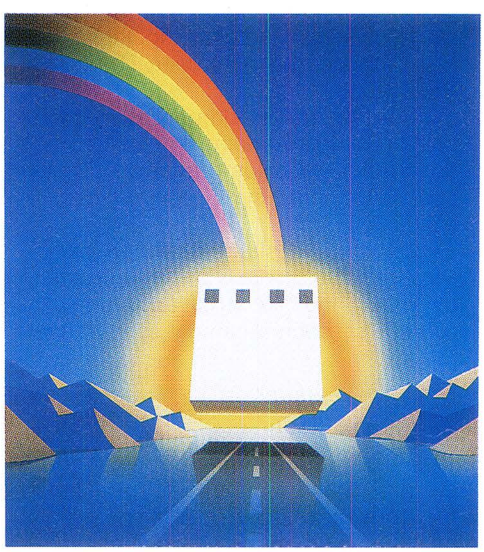
Able One costs $300 and is available from Able on (02) 816-3700



*(*6) ABLE V3.8 Hit Esc' to avoid saving files.*

*(*7) ABLE V3.8 sometimes appears to hang after use of the Del' key. Hit F3 to speed it up.*

A B L E One



*** 8 Powerful Applications, Macros, Windows and the future of PC computing, Multi-tasking!**

1) Word Processor
2) Spelling Checker
3) Spreadsheets
4) Communications
5) Database
6) Mail merge
7) Graphics
8) Windows

*** Plus FREE Introductory Training and 30 days FREE Hotline support!**

UNIX version also available!
Manufactured and distributed in Australia and South East Asia by:
ABLE
Products of Australia Pty. Limited.
Ph: (02) 816 3700.

*(*8) ABLE One is 90% Australian by value. Buyers who receive a bundled or retail copy made in Australia are entitled to a free half days tuition.*

Handling your hard disk

Painless techniques for IBM PCs and compatibles that give you total mastery over your hard disk — and turn it into a true power tool.

We've said it before — the single most important productivity enhancement for most users is a fast hard disk. A hard disk gives you instant access to all your files, speeds up operation dramatically, and makes 'disk full' errors a lot less common. Floppies are how new software products are packaged, and how you back up your files (unless you own a tape drive or Bernoulli Box). They're also for the birds.

Hard disks used to be expensive and unreliable. That's all changed. Today they're inexpensive and unreliable.

Even the most expensive hard disks are frail and transitory. Many users wedge PC ATs into floor stands beneath their desks, which is fine until they start playing knee-hockey with their systems. Others blithely slide working XTs back and forth across their desks to make room for paperwork, or routinely lift a corner of the chassis to retrieve something that may have burrowed beneath it.

You've all probably seen versions of the illustration in Fig 1, where a human hair, a smoke particle, and even the greasy mess of a fingerprint seem enormous compared to the gap between the magnetic head of a hard disk and the rotating disk platter itself. With tolerances slightly above the angstrom level, dropping a chassis half a centimeter, or tapping it with your toe, is the hard disk equivalent of an atom bomb going off directly overhead.

It's true that the packages like 'The Norton Utilities' and 'Mace Utilities', and even the pathetic DOS RECOVER command, can rescue parts of text files that remain intact after a bounced magnetic head has plowed little oxide furrows into the disk surface. But these programs aren't very good at resurrecting program files or chunks of data stored in binary format. And when you see a message like

```
General Failure error reading drive C
Abort, Retry, Ignore?
```

well, that's what backups are for.

If you set up your hard disk properly, you'll not only take the anguish out of daily backups, but you'll also end up working smarter and more efficiently. While you'll have to learn how to handle subdirectories, the tips and utilities we provide in this article should make it a breeze.

If you don't like the do-it-yourself method, buy a program like 'X-Tree' or 'DOS2ools,' or pick up the new 'Norton Utilities 4.0', all of which help you navigate through your subdirectories. But once you learn the basics, you'll be able to solo with the best of them.

Cold start

Dealers nowadays test and set up hard disks before shipping them to purchasers. Unfortunately, they also usually follow the truly rotten advice in the DOS manual and copy all the files from the master DOS disks onto the root directory. For best performance, if you log into a brand new hard disk, type DIR, and see the listing scroll off your screen, you should clean things up. But you can't just erase or move all the files there; we'll tell you which ones

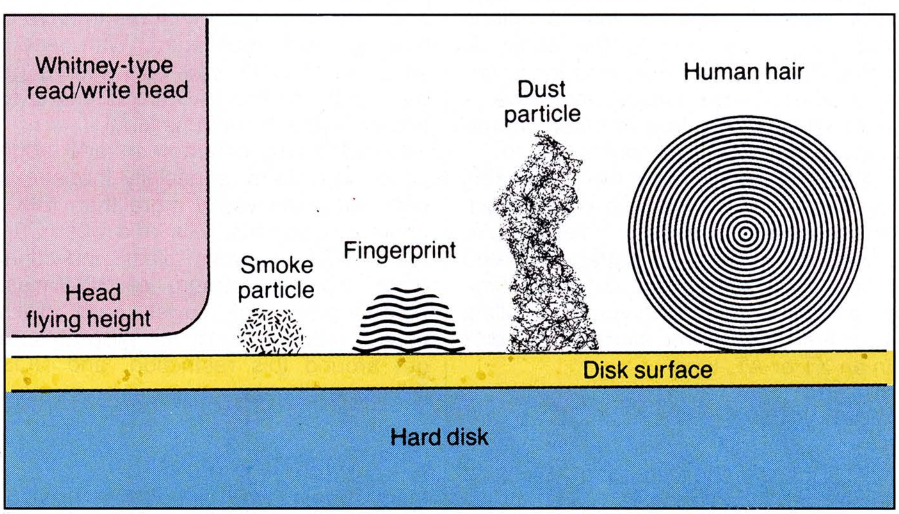


Fig 1 Relative size of assorted dirt and pollutants, compared with the smaller gap between a typical hard disk and its floating magnetic read/write head

have to stay in a moment. If your dealer or MIS department didn't set up your system, and you have a single 30Mbyte or smaller hard disk, it's fairly straightforward.

(If you have an AT that no one has touched, and all you see when you try to start is a '161 — System Options Not Set' message, hunt for the SETUP program, which IBM perversely buried on its AT Diagnostics disk. Put this disk in drive A:, turn the computer on, hit F1 when prompted, and answer the questions about date, time, hard disk type, floppy disk type(s), and memory size. If you need to know the drive type, check to see that it's not in the documentation that came with your system. Then take the cover off and look for the number on the label on the front of the drive. Then call your dealer.)

Once the SETUP program has run, insert your DOS disk in drive A: and turn your system on. Hit the Enter key twice when asked for the date and time. Type in

FDISK

and hit the Enter key, and when you see the 'Fixed Disk SETUP Program' screen, accept the defaults by hitting the Enter key again to create a DOS partition, and then once more to tell the program you want to devote the entire hard disk to DOS.

You can slice up a standard hard disk into as many as four partitions and jump from one to the other by using FDISK. Take our word for it, unless you're adventurous and have a penchant for dabbling in other operating systems, you really don't want to.

After you've answered the partitioning questions, hit any key and your system should reboot. This time, unless you're using an AT with a battery-operated clock, enter the correct date and time when asked. Assuming you're installing your first 30Mbyte or smaller hard disk in an XT or AT, type

FORMAT C:/S/V

and, if necessary, verify that you want to proceed by entering Y.

After a few minutes the system will prompt you for a volume name. This can be any short name you like, for example, 'DISK_C' or 'BILLS_XT'. The /S suffix or 'switch' tells DOS you not only want to format the hard disk, but want to add the three 'system' files — IBMBIO.COM, IBMDOS.COM (or their non-IBM-specific cousins), and COMMAND.COM — to it so you can boot without having to stick a DOS floppy disk in drive A:.

If you forgot to add the /S, or if your system is delivered with a hard disk that's been FDISKed and formatted but without these three system files, turn your system on with your main DOS disk in drive A:, enter the correct date and time information, and then type

SYS C:
COPY COMMAND.COM C:

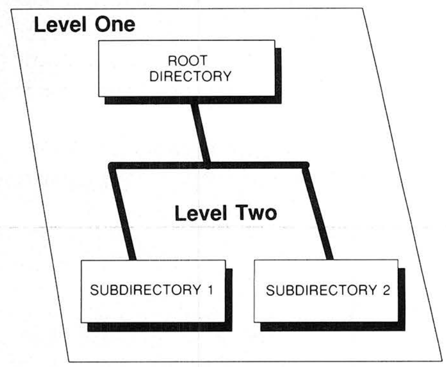
'You can slice upa standard hard disk into as many as four partitions·and jump from one to the other by using FDISK, but you really don't want to.'

The /V switch tells DOS to let you add a volume name. This doesn't really do much except let you personalise your directory listings and CHKDSK reports, and avoid the pesky 'Volume in drive C has no label' messages. With recent versions of DOS you can always go back and use the LABEL command to add or revise the volume label.

It's becoming common to add additional hard disks, especially monstrous ones that hold vastly more than IBM's original issue 10s, 20s and 30s. Current DOS versions limit individual drives to a maximum of 32Mbytes. Manufacturers of larger hard disks usually add small driver programs to get around this restriction, and DOS 3.3 makes it easy.

DOS family tree

Many users who are either lazy or befuddled by the terse explanation of subdirectories in the DOS manual end up dumping all their files into the main, or 'root,' directory. It's called a root directory because all other subdirectories branch off it in a shape vaguely resembling an inverted tree, or more accurately, a family tree (with the progenitor planted at the top and all the descendants fanning out beneath him). An absurdly simple representation would look like this:



You could obviously make the tree much more complex, with third, fourth, and fifth levels dangling below the second, each one bristling with additional subdirectories. Too few subdirectories and you end up with unmanageable numbers of files in each; too many and you can run into PATH problems (more about those difficulties later).

The schematic representation of your subdirectory structure doesn't have to be in the form of a symmetric tree. An equally valid way to describe the above setup is

```
—ROOT  -+-   SUBDIRECTORY #1
        |
        +-   SUBDIRECTORY #2
```

The root of the tree is at the top, so it's really an upside-down tree. A lower level is one farther away from the root. As you go higher in the tree, you get closer to the root. This sounds confusing, and it is. Just be thankful that IBM didn't choose Unix instead of DOS.

IBM's XT and AT hard disks (which, in its typically contrary way, IBM calls 'fixed' disks because they're fixed in place and not removable like floppies) can hold between 10 and 30 million characters; those from other manufacturers can squirrel away as many as half a billion. With storage space so capacious, keeping similar files grouped together is a necessity. Other-

wise you (and DOS) would have to sort through hundreds or thousands of files each time you wanted to find a single program to run.

Just as you can't be at two places at the same time (unless you have a good lawyer), DOS lets you log into only one subdirectory at a time. When you first boot up, DOS logs you into the root directory of either your hard disk or the diskette in drive A:. If you (or your dealer) installed the necessary DOS system files on your hard disk, and if you either didn't have a floppy disk in drive A: or had one there but left the drive A: door open, you'll boot off the hard disk. If this doesn't happen, it's probably because you have either some bizarre Brand-X hard disk or a PC-1 with an old ROM chip that doesn't understand hard disks.

Bare roots

You really need only three files in your root directory:

COMMAND.COM
AUTOEXEC.BAT
CONFIG.SYS

Actually, a root directory formatted with the /S/V option will contain two additional, 'hidden' files, IBMBIO.COM and IBMDOS.COM (or Microsoft's generic versions of these), plus the volume label (which is also stored in a small hidden file). They're called hidden files since they won't show up in normal directory searches. But they're there, and you can see at least the system files at the top of the list when you type

CHKDSK C:/V

IBMBIO.COM contains additions and corrections to the gut-level device-handling BIOS routines that come with your system on ROM chips. IBMDOS.COM provides other fundamental services for things like copying and deleting files, searching through the directory, or reading the keyboard.

COMMAND.COM is the primary command interpreter, processor, and loader that watches what you type at the DOS prompt. When it sees you trying to execute 'internal' commands such as DIR, TYPE, RENAME, COPY, or ERASE, it can dispatch these right away, since the main routines for these are stored inside COMMAND.COM (which is why they're called internal commands). When it can't find an internal command to match what you typed — such as FORMAT, or SORT, or 123 — it looks in a set of directories you specify (called a PATH) for files with .COM, .EXE, or .BAT extensions, and tries to load or execute these external commands. In addition, a disposable part of COMMAND.COM looks for the startup AUTOEXEC.BAT file and executes it right after bootup if it finds one.

'Some programs, in spiteful attempts at copy protection, install hidden files that you can't see in directory searches.'

Every hard disk system should have an AUTOEXEC.BAT file, if only to set the proper system PROMPT. But it's also handy for loading resident 'pop-up' programs like 'SideKick' into memory, changing screen colours, setting operating modes (to switch monitors or specify communications protocols, for instance), copying files into RAMdisks, and otherwise automatically configuring your system the way you like it.

Actually, AUTOEXEC.BAT doesn't have to be located in the root directory, and doesn't even have to have a .BAT extension, even though it's a batch file. (See 'Booting up with BERNIE' later in this article.)

The normal DOS hard disk prompt is a cryptic

C>

which tells you only that at that moment DOS recognises drive C: — rather than the others in your system — as the active drive. Once you start creating subdirectories and jumping around from one to another, you'll want to know which subdirectory you're currently logged into. By issuing the command

PROMPT PG

you'll tell DOS to report the name of the subdirectory along with the drive that's active, each time you finish executing a command or program. The root directory prompt will change to

C:\>

The solitary Backslash is DOS's shorthand for indicating the root directory. If the Backslash-Greater-Than-Sign combination is too visually jarring, you could adapt the prompt to

PROMPT $P:

which will make the root directory appear on-screen as

C:\:

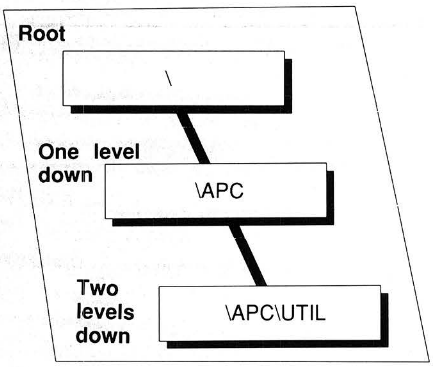
Remember, the \ sign all by itself stands for the root directory. You can always see what's in the root directory, for instance, by typing

**DIR **

Later, when you add other subdirectories, you'll wrap subdirectory names and their files with \ characters. So a subdirectory called APC that's one level down from the root directory would actually be called \APC. And if you were to branch an additional subdirectory off \APC and call it \UTIL, the actual name of this new subdirectory would be \APC\UTIL. A file called TOOLS.DOC in this new subdirectory would actually be called \APC\UTIL\TOOLS.DOC.

One of the handiest but most confusing aspects of naming files in subdirectories is that you could pepper your hard disk with other TOOLS.DOC files. So a TOOLS.DOC file on drive C: in the \APC subdirectory would really be C:\APC\TOOLS.DOC, while a different version in the root directory would be C:\TOOLS.DOC. The full name of any file has three parts: drive letter, path, and the actual filename-plus-extension.

A representation of this structure looks like this:



The root directory doesn't have a user-defined name such as APC, so DOS designates it as just \ with nothing following it.

The PROMPT command can do all sorts of tricky things, such as reporting the time and date or the DOS version. If you ask it to, it will print the current time whenever you do something that summons another DOS prompt, such as hit the Enter key again or finish executing something. It will not act as a clock and display the continuously changing time. And it will display time in hundredths of seconds based on a 24-hour clock. If you want it to print just the hours and minutes and nothing else, you can backspace away everything else with the command.

PROMPT It's now THHHHH$H

Users who discover the PROMPT command's flexibility invariably end up creating strange prompts such as

PROMPT +QQQQ+$_$B NG $B $_+$QQQ$Q+$_

which produces

```
+====+
| C> |
+====+
```

or perhaps

PROMPT LN$G LNG_ B_ QQQ_

which yields

```
<C> <C>
   |
  ===
```

A less frivolous use of the PROMPT command is in sending Escape sequences to the ANSI. SYS extended screen driver, which can give you precise control over the way your monitor looks and works.

The real strength of including $P in any PROMPT command is that when you log into a subdirectory, DOS will display the name of that subdirectory. So if your PROMPT setting is $P: and you create a subdirectory called STAR where you keep all your 'WordStar' files, and you move from the root directory into that subdirectory, your prompt will change from

C:\:

to your exact location in

C:\STAR:

To see the command that most recently configured your prompt, type SET on a line by itself, which displays the system's 'environment' — the fundamental settings that tell DOS where to look for key files and how to prompt the user. To restore the prompt to its original C>, just type PROMPT with nothing following it.

Customising your prompt isn't all roses. Once you tell DOS to include the subdirectory name in the prompt, it will relentlessly seek one out. So if you have a $P in your PROMPT command and log into a floppy drive, then remove the disk from that floppy drive and do something that generates an 'Abort, Retry, Ignore?' (or 'Abort, Retry, Fail?' in DOS 3.3) message, DOS won't budge until you stick the diskette back in the floppy slot.

A second disadvantage is that if you have tons of multilayered subdirectories with long directory names, and you're logged into one five levels deep, the prompt may be so long that your commands may wrap around the right edge of your screen. The best solution: keep subdirectory names short. While subdirectories are really just specially treated files, and can have 11-character names just like files, avoid the temptation. In addition to preventing wraparound problems, this will make it far easier to switch between subdirectories. It's a lot simpler to type \WS\UT than \WORDSTAR\UTILITY.WPR, especially when you're doing it several times a day. (While you're at it, truncate the names of programs you use every day. Why type EDITOR when you could just key in ED?) Also, resist the temptation to use extensions in subdirectory names since they'll just make the whole process more cumbersome and prone to error. Another solution to wraparound ills, by the way, is to end all your prompts with a $_ which jumps the cursor down to column 1 of the line below.

Cleaning up your act

The only other file that has to be in the root directory is CONFIG.SYS. Your system will run without a CONFIG.SYS file but it will work better with one than without. And certain programs demand one. If you're using a database manager, for instance, that handles more than eight open files at once, you have to prepare DOS for juggling the extra ones with a FILES= command in CONFIG.SYS. You can also do things like use the COUNTRY= command to mix and match foreign currency symbols and odd time and date formats (if you're not satisfied with having to cope with the American 'reverse date notation').

But where CONFIG.SYS really shines is in increasing disk-read buffers, loading device drivers, and adding logical drives to your system.

For some odd reason, IBM specified a default of two buffers for the XT, and a paltry three for the AT. Buffers are simply chunks of memory set aside to store the data your system most recently read from or wrote to your disk. If you have to go back and read the same data, it's far speedier to do so via these memory buffers than to have to move the magnetic heads again and slurp up the information from the physical disks one more time.

Buffer needs vary from system to system, and the number of buffers is often a topic of heated discussion when tech types get together. Virtually everyone agrees that three is a joke. Somewhere around 10 or 15 seems right for XT users, and 20 or 30 for AT users. Specifying too many is as detrimental to performance as too few, since your system will end up wasting time as it churns through data it will never use.

DOS 3.3 adjusts this automatically.

If you currently have a directory crammed with hundreds of files, it's easy to demonstrate how increasing the number of buffers can help boost performance. First, make sure you don't have a CONFIG.SYS file, or that if you do it doesn't contain a BUFFERS= command. If yours does, rename it temporarily.

Reboot and issue a DIR command. The first few dozen files scroll rapidly by, but eventually the buffers fill and the display suddenly turns balky. If you get tired of watching your files bounce slowly upward, interrupt the directory listing by holding down the Ctrl key and tapping either the C key or the ScrollLock key. Then, when you're back in the root directory at the DOS prompt, create a CONFIG.SYS file by typing

COPY CON CONFIG.SYS

and then hitting the Enter key. The cursor will drop down a line. Type

BUFFERS=15

and then hit Enter, the F6 function key, and then the Enter key again. You'll see the message

1 File(s) copied

Reboot and reissue the DIR command. Now virtually all the files will fly by, not just the first few, since your system can load a giant chunk of directory data from your disk into memory at one pass and not have to keep reading the disk in little sips.

CONFIG.SYS is also where you instruct your system to load device drivers such as the DOS VDISK.SYS 'virtual disk' (RAMdisk), or drivers to link your basic hardware with mice, nonstandard external storage devices, pre-DOS 3.3 3.5in floppy drives, or giant hard disks.

And it's where you tell DOS how many drives you're going to want to use. When you boot up, DOS assumes a maximum of 5 (drives A: through E:). But if your system is loaded to the gills with hard disks, half-heights, microfloppies, and other exotica, you might need more. And if you use the SUBST command to fool your system into treating a subdirectory like a disk drive to get around PATH or environment limitations, you'll have to prearrange it with a 'LASTDRIVE=' CONFIG.SYS command.

Apart from the hidden DOS system files, COMMAND.COM, AUTOEXEC.BAT, and CONFIG.SYS, a well-organised disk's root directory should contain no other files. Well, technically, if you used the /V switch in formatting your hard disk or later added a volume label with the LABEL command, the name itself is kept in an additional hidden file.

Some users don't mind having their important DOS utilities in their root directory, and cut through the clutter of a messy directory with a DIR/P (paused directory) or DIR/W (wide directory) command. This won't radically degrade performance, and may actually be a little faster than storing them in a separate \DOS subdirectory, if these files are kept at the very beginning of the hard disk directory. But it's even faster to keep them on a RAMdisk. And clutter gets to be a bad habit — soon you start dumping files anywhere. Users who run the directory comparison utility in this month's TJ's Workshop are always amazed at the large number of misplaced and misfiled programs and data.

> *'Your system will run without a CONFIG.SYS file, but it will work better with one than without.'*

Earlier we said it was a good idea to clean up a root directory that was cluttered with extraneous files. If all a dealer or corporate systems installer did when setting up your brand new system was copy all the DOS files from their original floppies to your root directory, you can go ahead and erase everything except COMMAND.COM (which you'll need to reboot).

You can see if all the files in your root directory are also on your DOS disk by putting the DOS disk in drive A: and then typing

DIR C:/W

and then

DIR A:/W

for a wide display, filenames-only listing. Or, turn on your printer and either type

DIR C: > PRN

and then

DIR A: > PRN

or hold down the Ctrl key and hit P (or PrtSc) to toggle your printer on so that it echoes everything simultaneously to the printer and the screen and type DIR C: and then DIR A: for a printed copy of your directory listing. If you used the Ctrl-P (or Ctrl-PrtSc) technique to turn simultaneous printing on, hold down the Ctrl key and type P (or PrtSc) once more to toggle it off.

You can also see what's on your disk by sorting the files in order of their extension. The command

DIR | SORT /+10 | MORE

will make it easy. For this to work, the DOS SORT.EXE and MORE.COM files must be on the current directory or in directories that you've included in your PATH command.

Any way you do it, if you see that all you have on your root directory are DOS files, erase all but COMMAND.COM (you'll put them back in their proper place later).

If you have AUTOEXEC.BAT or CONFIG.SYS files, examine their contents by using the TYPE command. To see what's inside CONFIG.SYS, just type

TYPE CONFIG.SYS

If you see other files listed, such as

DEVICE=VDISK.SYS 360
DEVICE=ANSI.SYS
DEVICE=MOUSE.SYS

you'll want to leave VDISK.SYS, ANSI.SYS, and MOUSE.SYS where they are on the root directory. Later you can move them out of the root directory to a subdirectory called \BIN (so named because that's where you store your programs, which are in binary, nontext format), and change the

DOS 3.3 adjusts this automatically.

If you currently have a directory crammed with hundreds of files, it's easy to demonstrate how increasing the number of buffers can help boost performance. First, make sure you don't have a CONFIG.SYS file, or that if you do it doesn't contain a BUFFERS= command. If yours does, rename it temporarily.

Reboot and issue a DIR command. The first few dozen files scroll rapidly by, but eventually the buffers fill and the display suddenly turns balky. If you get tired of watching your files bounce slowly upward, interrupt the directory listing by holding down the Ctrl key and tapping either the C key or the ScrollLock key. Then, when you're back in the root directory at the DOS prompt, create a CONFIG.SYS file by typing

COPY CON CONFIG.SYS

and then hitting the Enter key. The cursor will drop down a line. Type

BUFFERS=15

and then hit Enter, the F6 function key, and then the Enter key again. You'll see the message

1 File(s) copied

Reboot and reissue the DIR command. Now virtually all the files will fly by, not just the first few, since your system can load a giant chunk of directory data from your disk into memory at one pass and not have to keep reading the disk in little sips.

CONFIG.SYS is also where you instruct your system to load device drivers such as the DOS VDISK.SYS 'virtual disk' (RAMdisk), or drivers to link your basic hardware with mice, nonstandard external storage devices, pre-DOS 3.3 3.5in floppy drives, or giant hard disks.

And it's where you tell DOS how many drives you're going to want to use. When you boot up, DOS assumes a maximum of 5 (drives A: through E:). But if your system is loaded to the gills with hard disks, half-heights, microfloppies, and other exotica, you might need more. And if you use the SUBST command to fool your system into treating a subdirectory like a disk drive to get around PATH or environment limitations, you'll have to prearrange it with a 'LASTDRIVE=' CONFIG.SYS command.

Apart from the hidden DOS system files, COMMAND.COM, AUTOEXEC.BAT, and CONFIG.SYS, a well-organised disk's root directory should contain no other files. Well, technically, if you used the /V switch in formatting your hard disk or later added a volume label with the LABEL command, the name itself is kept in an additional hidden file.

Some users don't mind having their important DOS utilities in their root directory, and cut through the clutter of a messy directory with a DIR/P (paused directory) or DIR/W (wide directory) command. This won't radically degrade performance, and may actually be a little faster than storing them in a separate \DOS subdirectory, if these files are kept at the very beginning of the hard disk directory. But it's even faster to keep them on a RAMdisk. And clutter gets to be a bad habit — soon you start dumping files anywhere. Users who run the directory comparison utility in this month's TJ's Workshop are always amazed at the large number of misplaced and misfiled programs and data.

> *'Your system will run without a CONFIG.SYS file, but it will work better with one than without.'*

Earlier we said it was a good idea to clean up a root directory that was cluttered with extraneous files. If all a dealer or corporate systems installer did when setting up your brand new system was copy all the DOS files from their original floppies to your root directory, you can go ahead and erase everything except COMMAND.COM (which you'll need to reboot).

You can see if all the files in your root directory are also on your DOS disk by putting the DOS disk in drive A: and then typing

DIR C:/W

and then

DIR A:/W

for a wide display, filenames-only listing. Or, turn on your printer and either type

DIR C: > PRN

and then

DIR A: > PRN

or hold down the Ctrl key and hit P (or PrtSc) to toggle your printer on so that it echoes everything simultaneously to the printer and the screen and type DIR C: and then DIR A: for a printed copy of your directory listing. If you used the Ctrl-P (or Ctrl-PrtSc) technique to turn simultaneous printing on, hold down the Ctrl key and type P (or PrtSc) once more to toggle it off.

You can also see what's on your disk by sorting the files in order of their extension. The command

DIR | SORT /+10 | MORE

will make it easy. For this to work, the DOS SORT.EXE and MORE.COM files must be on the current directory or in directories that you've included in your PATH command.

Any way you do it, if you see that all you have on your root directory are DOS files, erase all but COMMAND.COM (you'll put them back in their proper place later).

If you have AUTOEXEC.BAT or CONFIG.SYS files, examine their contents by using the TYPE command. To see what's inside CONFIG.SYS, just type

TYPE CONFIG.SYS

If you see other files listed, such as

DEVICE=VDISK.SYS 360
DEVICE=ANSI.SYS
DEVICE=MOUSE.SYS

you'll want to leave VDISK.SYS, ANSI.SYS, and MOUSE.SYS where they are on the root directory. Later you can move them out of the root directory to a subdirectory called \BIN (so named because that's where you store your programs, which are in binary, nontext format), and change the

CONFIG.SYS file so that it says

DEVICE=\BIN\VDISK.SYS 360
DEVICE=\BIN\ANSI.SYS
DEVICE=\BIN\MOUSE.SYS

Similarly, if you use the TYPE command to examine AUTOEXEC.BAT and see that it loads 'SideKick' with the command SK, leave SK.COM in the root directory for now. Later, if you create a third-level subdirectory below \BIN called \BIN\KICK and move your 'SideKick' files there, you would change the line in your AUTOEXEC.BAT file from

SK

to

\BIN\KICK\SK

Chock full

You can store up to 64 files in the root directory of a single-sided floppy disk (if you can still find one), and 112 files in the root directory of a more common 360k floppy. The root directory of larger diskettes holds 224. And there's space on most hard disk root directories to store 512 files.

But don't test this out on your disk. If you do, you'll end up after the 509th with a 'File creation error' message (the 510th, 511th, and 512th are the two hidden system files and the hidden volume label). Any subdirectory entries you may have in the root directory are really just special types of files, so they're included in the count too. So you run out of room well before you actually have a chance to create file 512.

The number of directory entries in a subdirectory is limited only by available space on the disk. That's because each subdirectory is really just a special kind of file that keeps track of other files. Because the subdirectory itself is a file, it can grow the same way a data file grows when you add information to it.

Remember — if you really want to organise your hard disk properly, don't put any other files on your root directory besides the ones mentioned above. Then, when you type

DIR C:

all you'll see is one screenful of your bootup files and main subdirectory listings. It'll be an index into your well-organised hard disk.

Disk tools

When IBM introduced its hard disk XT, it added several Unix-like subdirectory features (as well as a Unix-like tree structure) to the new release of DOS that accompanied it (Version 3.3 adds an APPEND command to enhance PATH searches for nonexecutable files). Among these powerful new commands were

MKDIR (and MD)
RMDIR (and RD)
CHDIR (and CD)
PATH

Nobody anywhere ever uses MKDIR, RMDIR, and CHDIR, since the shorthand versions MD, RD, and CD will do just fine. Avoid them, unless you're the kind of prolix twit who prefers words like 'utilise' rather than the shorter 'use.' Of course, since the IBM DOS manual is not exactly what you'd call friendly, you can't look up these commands by hunting for the shorthand versions in the alphabetical reference section. MD, CD, and RD aren't even in the DOS manual's index. Nice touch, IBM.

The MD command creates a new subdirectory. The first thing you should do after running FDISK and FORMAT is create a DOS subdirectory. To do this, type

MD \DOS

If you were sure you were in the root directory, you could also type

MD DOS

since both commands will do the same thing — create a subdirectory one level down from where you currently are, in the root directory.

By omitting the Backslash (as in MD DOS) you're saying, 'Create a directory called DOS that's one level down in the subdirectory tree from where I currently am.' By including the Backslash (as in MD \DOS) you're saying, 'Create a directory called DOS that is one level down from the root directory,' since the single Backslash specifies the root directory.

The method *without* the backslash uses relative locations. The technique *with* the backslash uses absolute locations. Both have their advantages. We'll discuss this in more detail later. This is a critical distinction and a point of real confusion among new hard disk users. (And it isn't all that unusual; many DOS commands allow alternate phrasings. For instance, you can use several different syntaxes to perform the same COPY command, depending on what you want to do.)

Once you've created the \DOS subdirectory, log into it (or Change Directories) from the root directory by issuing the CD DOS (or CD \DOS) command. Here's a shortcut — once you've typed MD \DOS to create the subdirectory, type the letter C and then hit F3. F3 repeats the previous command, so it will fill in the command line with the rest of what you typed at the previous DOS prompts. So at the C> prompts, you'd type

MD \DOS

and hit the Enter key. Then you'd type

C

and hit F3. As soon as you did you'd see

C>CD \DOS

Hit the Enter key and DOS will log you into your new \DOS subdirectory, and you'll see

C>

How do you know you're in the \DOS subdirectory? If you type in DIR you'll get something like

```
Volume in drive C is APC
Directory of C:\DOS
.             <DIR> 6-10-87   10:48p
..            <DIR> 6-10-87   10:48p
        2 File(s) 20840448 bytes free
```

You can see the current directory in the second line of the DIR report. But if

ALLAW SALES

Sponsored by Allaw Sales and Fujitsu

FUJITSU

you remembered to set your PROMPT to $P: you could automatically tell which directory you were logged into, since instead of

```
C>
```

as soon as you typed CD \DOS you'd see

```
C:\DOS:
```

Typing CD by itself will also display the current subdirectory. But that's an extra step.

Notice that DOS already thinks you have two files in the \DOS subdirectory with the peculiar names . and .. and with <DIR> where the file size usually goes. We'll talk about the dot notation a little later. The <DIR> tells us we're dealing with subdirectory entries.

Now go back to the root directory. You can do this one of two ways.

You can use the absolute location technique and issue a command that says 'move to the root directory'

```
CD \
```

or you can say 'move one level up from where I am' with the command

```
CD ..
```

You could have typed CD\ rather than CD \ and CD.. rather than CD .., since in this case DOS isn't picky about extra spaces. The double dot stands for the 'Parent' directory of the one you're currently logged into — the directory (or subdirectory) directly one level up toward the root. In this case, the only level up is the root.

If you're curious, the single dot stands for the directory you're currently in. This shorthand actually comes in handy when you're prompted for a subdirectory name and you're in one that's five levels deep and would rather type a single period than a long, elaborate pathname — although just pounding on the Enter key sometimes works in such situations.

In any event, once you've used the CD\ or the CD.. command and you're back in the root directory, type DIR and you'll see a new listing along with

```
Volume in drive C is APC
Directory of C:\

COMMAND  COM    23210  3-07-85   1:43p
CONFIG   SYS      128  1-11-87   3:27p
AUTOEXEC BAT      640  2-22-87   8:12p
DOS         <DIR>      6-10-87  10:48p
```

The <DIR> tells you that you now have a subdirectory one level down from the root directory.

Important files

You should now copy all the important files from you DOS floppy disks into your new DOS subdirectory. You can log onto drive A: and type

```
COPY *.* C:\DOS
```

or while working in the root directory in drive C:, type

```
COPY A:*.* \DOS
```

Or you could log into C:\DOS (with the CD DOS or CD\DOS command) and type

```
COPY A:*.*
```

Make sure you copy the important files from both the main DOS floppy disk and the supplemental one. However, you can skip some of the files nobody ever uses, such as VDISK.LST (a long assembly language source code file for programmers), anything ending with a .BAS extension (unless you think DONKEY is an exciting and challenging game), and some of the stranger utilities such as KEYBIT.COM and KEYBFR.COM, which load in foreign keyboard templates (in this case Italian and French). You can also toss Basic, since BasicA does everything Basic does and more. It's hard to believe, but some of the programs on even the most recent version of DOS will work only on the PCjr; try running MUSICA.BAS, for instance. Do, however, copy DEBUG.COM, which, for some bizarre reason, is on the Supplemental DOS disk. DOS 3.3 does away with frivolous files. However, it also does away with DEBUG.

Now that you've created a subdirectory (called \DOS) one level down from the root directory, go ahead and create another subdirectory on the same level as \DOS. called \BIN. But be careful. Why?

If you're currently logged into either the root directory or the \DOS directory, you could create \BIN with the ABSOLUTE command

```
MD \BIN
```

This command, in effect, says, 'Create a subdirectory one level down from the root directory and call it BIN.' The single \ prefix means 'one level down from the root directory.' However, if you forget the Backslash and try the command

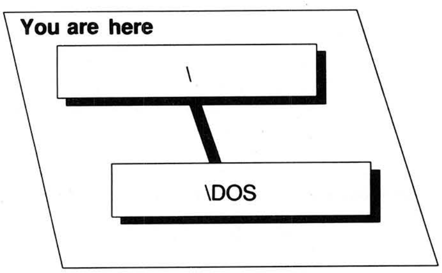
MD BIN

two things will happen, depending on where you currently are on your hard disk, since omitting the backslash makes this a relative command rather than an absolute one. Typing MD BIN will create a subdirectory one level

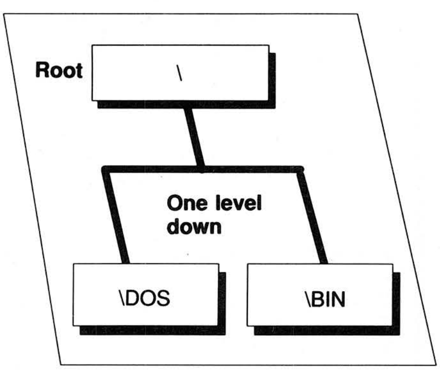
down from where you currently are. So if you're currently logged into the root directory, MD BIN will create a subdirectory called \BIN that's one level down from the root.

But if you're currently logged into \DOS, which is already one level down from the root, and you type MD BIN you'll end up creating a subdirectory called \DOS\BIN that's one level down from \DOS and two levels down from the root. That's because leaving out the backslash command makes it a relative command rather than an absolute one.

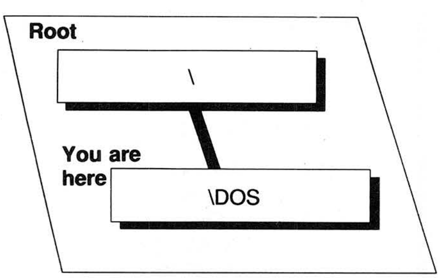
To recap, if you already have a subdirectory called \DOS, but you're currently logged into the root directory



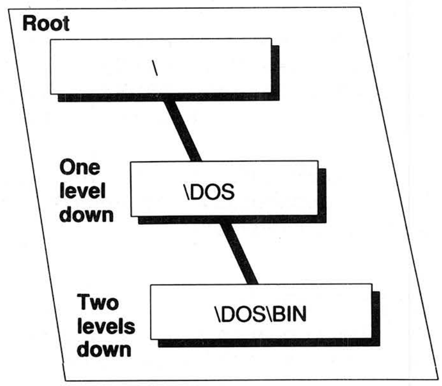
and you type MD BIN, you'll end up with



which is what you want. But if you're already one level down, in \DOS



and you type MD BIN, you'll get



Actually, it really doesn't matter which way you set up your subdirectories. Most users aren't really comfortable creating tree structures any more complex than one or two levels deep. Others prefer intricately filigreed systems. For best results, Keep It Simple. The only real reason to create lots of subdirectories branching off each other is if your work demands it.

For instance, if you're a CPA with many clients, each one deserves its own subdirectory, and each will require still deeper subdirectory levels of organisation. It's good practice to keep records separated by year or quarter or even month (depending on the quantity of files). But while it might make sense to keep expenses in one subdirectory and income in another, it would be ridiculous to have one called

\SMITHCO\1987\JUNE\EXPENSES\OFFICE \PENCILS

and another

\SMITHCO\1987\JUNE\EXPENSES\OFFICE \STAPLES

Necessary utilities

If you've followed the above instructions properly, you now have two subdirectories called \DOS and \BIN, each a single level down from the root directory. \DOS contains all the important files you copied from your two main DOS disks. \BIN should contain all the smaller non-DOS utilities and batch files you use every day.

Two utilities you absolutely, positively should have on your hard disk are VTREE.COM and BROWSE.COM, both on the IBM PC Utilities Disk, which is being supplied with each new and renewing subscription. (You could create VTREE.COM by typing in and running the Basic program in Fig 2.) And both belong in the \BIN subdirectory.

VTREE.COM displays a pictorial representation of the tree structure of the subdirectories on your hard disk. BROWSE.COM is a replacement for the DOS TYPE command that lets you scan rapidly through your files.

Once you've created your \BIN subdirectory, copy VTREE.COM and also copy BROWSE.COM into it (by adapting any of the syntaxes you used to copy your DOS files into \DOS, above). Log into \BIN by typing

CD \BIN

and run VTREE by typing

VTREE

You should see something that looks like this:

```
-+- DOS
 |
 +- BIN
```

This may not be a very impressive graphical representation, but it's vastly better than the disgraceful, nearly useless output produced by the DOS TREE.COM utility. All TREE.COM does is grind out a long, slightly confusing textual description. With just 2 subdirectories it's not so terrible, but with 20 or 30 all you get is an unmanageable scrolling mess. And displaying a graphic object such as a hierarchical tree with words alone is like trying to describe colours to someone who's congenitally blind.

TREE's version of the above subdirectory structure is

DIRECTORY PATH LISTING FOR VOLUME APC
Path: \DOS
Sub-directories: None
Path: \BIN
Sub-directories: None

You can make TREE slightly more useful adding a /F switch, which will display all the files in all the subdirec-

tories. But even this use of TREE is overshadowed by the far better CHKDSK/V, which also lists all the files on your disk. CHKDSK/V displays full path names; TREE/F doesn't. And TREE pads all its listings with unnecessary spaces, which makes it scroll rapidly off your screen. As a bonus, CHKDSK/V adds the standard CHKDSK report detailing the number of files, bytes free, etc. And it displays the hidden files; TREE/F doesn't. Finally, CHKDSK /V is far faster. Chugging through slightly more than 2,000 files on an AT took CHKDSK/V 98 seconds. TREE /F produced an inferior report and took 123 seconds, or 25 per cent longer.

When you copy VTREE.COM into you \BIN directory, the very next thing you should do is type

ERASE \DOS\TREE.COM

Duplicate names

Note that in the above example, the full name of the primitive DOS utility that you just expunged was \DOS\TREE.COM rather than just TREE.COM. That's because you can have different versions of similarly named files in different subdirectories. You can even have similarly named subdirectories; if you wanted to (and you don't) you could have a subdirectory called \DOS and one called \BIN\DOS on the same disk.

For instance, you could rename VTREE.COM to TREE.COM and put it in \BIN. So if you kept the original DOS version in the \DOS subdirectory, your hard disk would then contain files called

\DOS\TREE.COM

(which is the original DOS version) and

\BIN\TREE.COM

(which is the renamed version of the VTREE.COM utility). To run the original DOS tree version, you'd need to type

\DOS\TREE

To run VTREE.COM, which for this example you renamed to TREE.COM, you'd type

```
100 ' Program for creating VTREE.COM -- by Charlie Petzold
110 CLS:PRINT "Checking DATA; please wait..."
120 FOR B=1 TO 32:FOR C=1 TO 16:READ A$:TTL=TTL+VAL("&H"+A$):NEXT
130 READ S:IF S=TTL THEN 150
140 PRINT "DATA ERROR IN LINE";B*10+190;" -- REDO":END
150 TTL=0:NEXT:RESTORE
160 OPEN "VTREE.COM" AS #1 LEN=1:FIELD #1,1 AS D$
170 FOR B=1 TO 32:FOR C=1 TO 16:READ A$
180 LSET D$=CHR$(VAL("&H"+A$)):PUT #1:NEXT:READ DUMMY$:NEXT
190 CLOSE:PRINT "VTREE.COM CREATED"
200 DATA EB,5F,90,00,3A,5C,2A,2E,2A,00,28,43,29,20,43,6F,1112
210 DATA 70,79,72,69,67,68,74,20,43,68,61,72,6C,65,73,20,1545
220 DATA 50,65,74,7A,6F,6C,64,2C,20,31,39,38,35,49,6E,76,1330
230 DATA 61,6C,69,64,20,64,69,73,6B,20,64,72,69,76,65,24,1475
240 DATA 52,65,71,75,69,72,65,73,20,44,4F,53,20,32,2E,30,1286
250 DATA 20,2B,24,00,00,00,5C,2A,2E,2A,00,06,01,3C,03,00,403
260 DATA 00,3C,FF,75,0A,8D,16,2D,01,B4,09,CD,21,CD,20,B4,1495
270 DATA 30,CD,21,3C,02,73,06,8D,16,40,01,EB,EC,A0,5C,00,1420
280 DATA 0A,C0,75,06,B4,19,CD,21,FE,C0,8A,D0,04,40,A2,03,1793
290 DATA 01,FC,8B,16,5D,01,B4,1A,CD,21,8B,1E,54,01,03,DB,1428
300 DATA 80,3E,53,01,00,75,12,C7,87,FC,02,00,00,BA,03,01,1187
310 DATA B9,10,00,B4,4E,CD,21,EB,04,B4,4F,CD,21,73,03,E9,1784
320 DATA DE,00,8B,36,5D,01,80,7C,15,10,75,ED,83,C6,1E,80,1639
330 DATA 3C,2E,74,E5,FF,87,FC,02,8B,0E,54,01,E3,3A,83,BF,1940
340 DATA FC,02,01,74,21,2B,DB,B0,B3,F7,87,FC,02,00,80,74,1901
350 DATA 02,B0,20,E8,FD,00,51,B9,10,00,B0,20,E8,F4,00,E2,1887
360 DATA F9,59,43,43,E2,E1,83,BF,FC,02,01,75,0B,8B,0E,5F,1876
370 DATA 01,B0,C4,E8,DD,00,E2,F9,56,8B,36,5D,01,BF,80,00,1993
380 DATA 8B,D7,B9,2B,00,F3,A4,5E,B4,1A,CD,21,B4,4F,CD,21,2024
390 DATA 72,14,80,3E,95,00,10,75,F3,B0,C2,83,BF,FC,02,01,1796
400 DATA 74,15,B0,C3,EB,11,B0,C4,83,BF,FC,02,01,74,08,B0,2009
410 DATA C0,81,8F,FC,02,00,80,E8,99,00,B0,C4,E8,94,00,B0,2159
420 DATA 20,E8,8F,00,B9,0D,00,8B,3E,5B,01,AC,0A,C0,74,06,1394
430 DATA AA,E8,7F,00,E2,F5,B0,20,E8,78,00,89,0E,5F,01,89,1944
440 DATA 3E,5B,01,FF,06,5B,01,BE,56,01,B9,05,00,F3,A4,FF,1636
450 DATA 06,54,01,C6,06,53,01,00,83,06,5D,01,2B,E9,F2,FE,1382
460 DATA 83,3E,54,01,00,74,4A,F7,87,FC,02,FF,7F,75,0A,B0,1789
470 DATA 0D,E8,3F,00,B0,0A,E8,3A,00,BF,03,01,B9,46,00,B0,1410
480 DATA 00,F2,AE,4F,B9,40,00,B0,5C,FD,F2,AE,F2,AE,47,89,2305
490 DATA 3E,5B,01,FF,06,5B,01,BE,56,01,B9,05,00,FC,F3,A4,1633
500 DATA FF,0E,54,01,C6,06,53,01,01,83,2E,5D,01,2B,E9,A1,1351
510 DATA FE,CD,20,52,8A,D0,B4,02,CD,21,5A,C3,00,00,00,00,1624
```

Fig 2 Charles Petzold's program to create VTREE.COM utility, which produces a graphic representation of a hard disk's hierarchical tree structure

\BIN\TREE

If you were in the root directory and hadn't yet used the PATH command to tell DOS where to look for executable files and you typed

TREE

you wouldn't run either \DOS\TREE or \BIN\TREE; all you'd get is a 'Bad command or file name' message. As discussed above, when you type in a command like TREE at the DOS prompt, COMMAND.COM first checks whether it's an internal command, and if it discovers it's not, checks a specified set of directories (called a PATH) for a file by that name with a .COM, .EXE, or .BAT extension. If \DOS and \BIN aren't yet included in the path, COMMAND.COM won't check in those subdirectories, and won't run either version of TREE.COM.

You can tell COMMAND.COM to check in both of these subdirectories with the command

PATH C:\DOS;C:\BIN

or

PATH C:\BIN;C:\DOS

The difference between these two is that if the top path is active, DOS will look in the \DOS subdirectory before it looks in \BIN. In the second example it

will examine \BIN before \DOS. If DOS finds a TREE file ending in .COM, .EXE, or .BAT, it will stop looking and execute the file. If the first path is in use, typing TREE will run the DOS version of TREE. If the second path is in use, DOS will find the renamed version of VTREE and then run it.

Incidentally, if you had files called TREE.COM, TREE.EXE, and TREE.BAT in either subdirectory, DOS would run TREE.COM. It always looks for .COM files first, then .EXEs, and finally .BATs. But DOS 3.2 or earlier won't look for filenames with any other extensions, such as data files or program overlays. This is a genuine problem that most power users get around by buying 'path extenders' that will look for any file with any extension in any specified subdirectories. The two most popular are SDA Associates' wonderful 'filePath' and a program called 'File Facility', written by an IBM employee and marketed half-heartedly by IBM. DOS 3.3 solves the problem with APPEND. They both work about the same.

It's best to include a path command like either of the ones above in you startup AUTOEXEC.BAT file. And if you're using a path extender or APPEND, add a separate line for it too.

We mentioned earlier that you could type SET to see the command that most recently configured your prompt. Typing SET on a line by itself will also display the current path setting. Typing PATH by itself will also do so. Modify your existing path setting by following the PATH command with the new list of subdirectories, joined together with semicolons.

A smarter technique for adding path settings, suggested by DOS expert Marvin Avery and adapted here, is to exploit the trick of using environment settings as variables.

Create a small batch file called ADDPATH.BAT by getting into DOS, typing in the lines below, hitting the Enter key at the end of each one, and then hitting the F6 key and the Enter key one final time when you're all done. Do it right and you'll get a '1 File(s) copied' message afterwards:

```
COPY CON ADDPATH.BAT
IF %1@==@ GOTO END
PATH=%PATH%;%1
:END
```

To test it out, assuming you don't already have any path set, create a simple path to your C:\DOS directory with

```
PATH=C: \DOS
```

Then type either PATH or SET to make sure you typed it in properly. To extend the path so it included C:\BIN, you'd ordinarily have to type

```
PATH=C: \DOS;C: \BIN
```

But if you have ADDPATH.BAT handy, all you have to do is type

```
ADDPATH C: \BIN
```

Then type SET or PATH again and you'll see the path setting has indeed been extended.

This isn't such a typing saver with such a small path. But when your path goes all the way across the screen, you'll appreciate it. It works by using an environment setting as a variable (the %PATH% is a variable that tells DOS, 'Look inside the current environment setting and substitute, in place of the %PATH% in the batch file, whatever follows the word PATH='). The technique also uses what is called a replaceable parameter — the %1. When DOS sees this in a batch file, it replaces the %1 with the first word or string of characters you typed on the command line immediately following the name of the batch file.

So if the batch file is called ADDPATH and at the DOS prompt you typed

```
ADDPATH HELLO THERE
```

it would replace the %1 with HELLO. If you wanted it to replace %1 with 'HELLOTHERE', you'd have to type either

```
ADDPATH HELLOTHERE
```

or, alternatively,

```
ADDPATH HELLO_THERE
```

since the %1 stops when it sees a space (or other 'delimiter' DOS uses to separate words). The 'IF %1@==@ GOTO END' (note the double equal sign) tests to see whether you typed anything in after the name of the batch file. If you did type something in, like HELLO, DOS replaces the %1 with HELLO and turns the test into

```
IF HELLO@==@ GOTO END
```

Now, HELLO@ is clearly not equal to @, so the test fails.

However, if you entered nothing after the name of the batch file, %1 would be equal to nothing, and DOS would turn the test into

```
IF @==@ GOTO END
```

Sure enough, @ does equal @, so the batch file will jump to the 'label' called :END. (Labels are preceded with colons and don't execute.) What this effectively does is jump around the 'PATH=%PATH%;%1' command if you forgot to enter an additional path extension.

However, if you did enter a new subdirectory and you wanted to have it tacked onto the end of your path, DOS would 'concatenate' it when it came to the line 'PATH=%PATH%;%1'. It would replace the %PATH% with the current path and the %1 with the new subdirectory you just typed in. And it would tack on the semicolon DOS uses to separate subdirectories. If the current path were

```
PATH=C: \DOS
```

and you typed in

```
ADDPATH C: \BIN
```

you'd end up with

```
PATH=C: \DOS;C: \BIN
```

If your PATH gets extremely long, you can quickly run out of space. You're limited to a default environment space (the place DOS stores its PATH and PROMPT information) of 160 bytes.

Keeping subdirectory names short saves environment space and wear and tear on your typing fingers. It's

also a good idea because the CD command can't handle more than 64 characters. If you absolutely can't live without long subdirectory names, and you run out of environment space, you can always use the SUBST command as shorthand in your AUTOEXEC.BAT file. Subdirectories really work pretty much like individual disk drives. SUBST blurs the distinction.

If you have a tangle of subdirectories on your hard disk like

C: \ABLE\BAKER\CHARLIE\FOXTROT

you could issue the SUBST command

SUBST E: C:\ABLE\BAKER\CHARLIE\FOXTROT

before you issue the PATH command. Then the short path command

PATH E:

will tell DOS to include the subdirectory C:\ABLE\BAKER\CHARLIE/FOXTROT in its path searches. This method cuts down on your typing and lets you treat long subdirectories the exact same way you'd treat drives. If you type

DIR E:

you'll see what files are included in C:\ABLE\BAKER\CHARLIE\FOXTROT. You can also use this trick to copy files in and out of that subdirectory. And you can log into it just by typing E: at the prompt. Note that you can't use a higher drive letter than E: unless you warn DOS beforehand in your CONFIG.SYS file with the LASTDRIVE= command. And you can create such drives temporarily.

SUBST E: /D

will undo the substitution. But if you're going to use this trick, read all the warnings in the SUBST section of the DOS manual. Commands like LABEL and BACKUP can cause problems with it. And SUBST is magic with programs like 'WordStar 3.x' that can find their overlays on specified drives but not subdirectories (APPEND is even better).

Notice that each of the subdirectories is preceded by a drive letter, C:. If all you ever do is use your C: hard disk and never log onto a RAMdisk or a floppy, you can omit this. A path such as

PATH=\DOS;\BIN

would work just as well in that case.

However, you should include the drive letters, because if you really want to boost performance you'll create a RAMdisk and copy your most frequently used programs — and all your long complex batch files — into it.

Speedy devices

As every power user knows, a RAMdisk is a section of memory that some software has tricked DOS into treating like an additional physical disk drive. RAMdisks are far faster than even the fastest hard disks, since they contain no moving parts. The tradeoff, of course, is that RAMdisks are volatile; all data stored on them vanishes when you turn the power off or when the current in your wall socket hiccups.

'RAMdisks are volatile; all data stored on them vanishes when you turn the power off.'

To install the free RAMdisk that comes with later versions of DOS, make sure the DOS VDISK.SYS program is in your C:\DOS subdirectory and include a line in your CONFIG.SYS file that says

DEVICE=C: \DOS\VDISK.SYS

This command will set up a virtual drive D: with 64k of available space. If you want a larger RAMdisk, you can specify the number of bytes at the end of the command.

DEVICE=C: \DOS\VDISK.SYS 360

would set up a drive D: that's the same size as a standard double-sided floppy. However, IBM won't let you DISKCOPY into it. RAMdisk software from other manufacturers, such as AST's SUPERDRV, will let you use the DISKCOPY command. IBM's VDISK driver will let you create multiple virtual disks, configure the sector size and number of directory entries, and, in the most recent versions of DOS, use extended memory.

The trick is to figure out which major programs, batch files, and utilities you use frequently and insert a cascade of commands in your AUTOEXEC.BAT file to copy those files to the RAMdisk. Then make sure your path includes this new drive. In the example we've been using, the path would now look like

PATH=D:\;C:\DOS;C:\BIN

Putting D:\ first means that the root directory of the RAMdisk is the first place DOS will look.

It's smart to put all your batch files except the tiniest ones into a RAMdisk, since batch files execute one slow line at a time. Watching even a hard disk grind its way through a medium- sized batch file is no fun at all.

Let's say you use three programs very often: CHKDSK.COM, a colour-setting and screen-clearing program called C.COM, and BROWSE.COM. Your AUTOEXEC.BAT file would contain the lines

COPY C:\CHKDSK.COM D:> NUL
COPY C:\C.COM D: > NUL
COPY C:\BROWSE.COM D:Z.COM > NUL

The > NUL at the end of each line gets rid of the '1 File(s) copied' messages. Notice that the third line not only copies BROWSE.COM to D: but also renames it to Z.COM. That's because Z is a lot easier to type than BROWSE, since Z is one letter long and happens to be at the lower-left-hand corner of the keyboard.

Safety first

Most software packages these days either come with instructions that suggest creating one or more dedicated subdirectories, or have their own installation programs that do it automatically.

However, these automatic installers can be downright dangerous. Some

replace your versions of AUTOEXEC.BAT and CONFIG.SYS with their own, when they really ought to modify yours rather than trashing them. Others hide files, which makes it difficult to remove subdirectories.

You can get around the first problem by using the TYPE command or BROWSE or your word processor to examine the .BAT and installation programs. If you see a command that simply copies program versions of AUTOEXEC.BAT and CONFIG.SYS to your hard disk, you can use your word processor to adapt your existing files rather than watching them get trashed.

A smart idea is to maintain a small subdirectory called \BAKUP containing nothing but your current versions COMMAND.COM, AUTOEXEC.BAT, and CONFIG.SYS. Every time you update one of these, copy it to the \BAKUP subdirectory. Then when a program installs itself destructively you can type

```
COPY \BAKUP  \
```

This is shorthand; you could have said

```
COPY \BAKUP\*.*  \
```

DOS thinks that when you tell it to perform a task such as copying or deleting and you specify just the name of the subdirectory, you really mean, 'do something to all the files in the subdirectory.' So if you have a \BIN directory and you type

```
DEL \BIN
```

Dos assumes you want to wipe out every file in the subdirectory, just as if you had typed

```
DEL \BIN\*.*
```

In both cases it will warn you in its quirky way with the message

```
Are you sure (Y/N)?
```

Keeping duplicates of your important root directory files in a \BAKUP subdirectory is also a good idea if you try to get too tricky. While DOS usually pauses to warn you if you try to delete all the files in a directory, you can sidestep the protection. Execute either of the commands

```
FOR %A IN (*.*) DO DEL %A
```

or alternatively,

```
ECHO Y | DEL * *
```

and DOS will merrily wipe out every last nonhidden file. The syntax for the above FOR...IN...DO command is correct if you type it in at the DOS prompt (be careful if you try this). But if you want to use it in a batch file, replace both single % signs with double %% signs (and be even more careful).

Hidden files can be a real problem with subdirectories. Few users end up keeping the same subdirectory structure for very long. Most end up cutting and pasting branches of the tree as they get more sophisticated or desperately short of space, or when they replace applications packages with newer ones.

The RD command removes subdirectories, but only when they're empty. If you've left even one file or lower-level subdirectory in them, you won't be able to expunge the subdirectory.

Some programs, in spiteful attempts at copy protection, install hidden files that you can't see in normal directory searches. If you try to remove a subdirectory that you think is empty and you see a

```
Invalid path, not directory, or directory
 not empty
```

message, first check to see if you've left any subdirectories branching off the one you want to get rid of. If so, you have to move or erase the contents of those lower-level subdirectories first, then use the RD command to remove them.

If there aren't any files or lower-level subdirectories, some nasty application has probably planted a hidden file there. You can check on this by executing the

```
CHKDSK /V | MORE
```

command, which will show all the files on your disk a screenful at a time, including the hidden ones. Then type in the following script using a pure ASCII word processor. Name it UNHIDE.SCR and be sure to hit the Enter key at the end of each line, especially the last one (with the Q). Also, be sure to leave blank lines above the line with the RCX and the line with the W:

```
N UNHIDE.COM
A
MOV BX,80
INC BX
CMP BYTE PTR [BX],20
JZ 103
MOV DX,BX
INC BX
CMP BYTE PTR [BX],D
JZ 116
CMP BYTE PTR [BX],0
JNZ 10B
MOV BYTE PTR [BX],0
MOV CX,20
MOV AL,1
MOV AH,43
INT 21
INT 20

RCX
24
W
N HIDE.COM
A 119
MOV CX,27

W
Q
```

Then put UNHIDE.SCR on the same directory as DEBUG.COM (or make sure that DEBUG.COM is in a subdirectory that you included in your PATH command) and type

```
DEBUG<UNHIDE.SCR
```

This process will give you two new utilities to put in your \BIN subdirectory — HIDE.COM and UNHIDE.COM. To hide a file called BONE, just type

```
HIDE BONE
```

and to unhide it, type

```
UNHIDE BONE
```

One last word of warning. Some particularly evil programs not only hide a file to prevent unauthorised copying, but scramble the way DOS keeps track of it. If you unhide it and then delete it, you may end up with a nastily scrambled hard disk. To avoid this potentially disastrous problem don't

buy copy-protected software — and back up often.

Subdirectory navigation

It's easy to create new subdirectories and move around inside existing ones if you have the right tools handy and follow a few simple rules.

The first rule is to remember that when you want to move up — toward the root directory — all you have to do is type the simple command

CD ..

(or CD..) to jump you to each successive parent directory. However, when you finally land in the root directory, you can't move up any other levels, so trying to do so will produce an 'Invalid directory' message.

What makes this especially easy is the F3 key. If you're in a subdirectory five levels deep called

LEV1\LEV2\LEV3\LEV4\LEV5

(you will be able to tell this by looking at the C:\LEV1\LEV2\LEV3\LEV4 \LEV5: prompt that your PROMPT $P: command displays) and you want to jump back to the root directory, you can do this the easy way, by typing

**CD **

or you can jump upward a level at a time by typing

CD..

once and then tapping the F3 key four more times. Each time you do, DOS will repeat the earlier command, and since that command is CD.. it will bounce you rapidly rootward.

(Get to know the F3 key, since it's a real labor saver. For instance, if you're creating a lower-level subdirectory with the MD command, and you make a typing mistake and end up creating one that's spelled wrongly, all you have to do is immediately type an R and then hit F3. This will send DOS an RD (Remove Directory) command to eradicate the erroneous one you just created. The syntax of making and removing directories is identical except for the first letter of the command, and once you type in the new first letter, F3 will dredge up the rest.)

```
100 'BATMAKR1.BAS
110 'This creates easy subdirectory switcher files
120 'Before you use this, get into DOS and type:
130 '
140 '    chkdsk / v | find "Dir" > tempfile
150 '
160 'For this to work properly, make sure each
170 '    subdirectory has its own unique name.
180 'To switch between subdirectories in DOS, type
190 '    name of the subdirectory WITHOUT the CD\
200 '    prefix, and WITHOUT the long PATHname
210 '    that usually precedes it.
220 'For instance, to switch to \DOS\BIN, just
230 '    type:  BIN
240 ON ERROR GOTO 380
250 ' --- read raw file, truncate left end of each line
260 OPEN "tempfile" FOR INPUT AS #1
270 IF EOF(1) THEN 370 ELSE LINE INPUT #1,A$
280 A$=RIGHT$(A$,LEN(A$)-12):IF A$="\" THEN 270
290 FOR A=LEN(A$) TO 1 STEP -1
300 IF MID$(A$,A,1)<>"\" THEN 320
310 NM$=RIGHT$(A$,LEN(A$)-A)+".BAT":GOTO 330
320 NEXT
330 PRINT "Creating ";NM$;" batch file..."
340 OPEN NM$ FOR OUTPUT AS #2
350 PRINT #2,"CD"+A$;:CLOSE #2
360 GOTO 270
370 CLOSE:KILL "tempfile.":PRINT:LIST 160-230:END
380 IF ERR=53 THEN LIST 120-140 ELSE ON ERROR GOTO 0
```

Fig 3 BATMAKR1.BAS is designed to create individual batch files that let you jump around your subdirectory tree structure by typing in just the subdirectory name without the log pathname that usually precedes it. Before running BATMAKR1, make sure CHKDSK.COM and FIND.EXE are on your disk (or are in subdirectories you've included in your PATH command) and type CHKDSK/V|FIND"Dir">TEMPFILE

To move in the other direction, down from the root directory to LEV5, you could, of course, simply type

CD \LEV1\LEV2\LEV3\LEV4\LEV5

You can't type

CD \LEV5

since that would tell DOS to jump you into a subdirectory called \LEV5 that was just one level down from the root directory. The real name of the \LEV5 subdirectory above is not \LEV5; it's \LEV1\LEV2\LEV3\LEV4\LEV5.

Another way to get there from the root directory is by using the relative version of the CD command to bounce you up one level at a time. Note that since DOS keeps track of each subdirectory by its full path name rather than just its particular branch on the tree, you could have a path like

C:\SHARE\AND\SHARE\ALIKE

since the subdirectory

C:\SHARE

is utterly different from

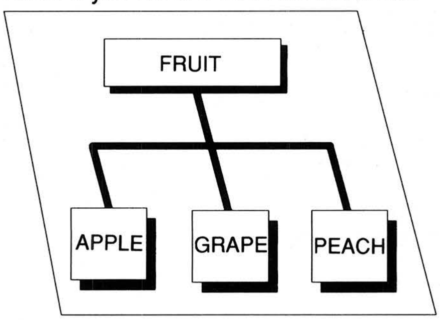
C:\SHARE\AND\SHARE

One is a single level down from the root directory, while the other is three levels down. However, having similar names like this is confusing and is a bad idea, for an important reason we'll see later.

To go from the root to the lowest branch one level at a time, you'd type

CD SHARE
CD AND
CD SHARE
CD ALIKE

When you're on one branch of a tree, it's easy to bounce around from one subdirectory to another on the same level. If you have a tree that looks like



and you're currently in \FRUIT\APPLE and you want to jump to \FRUIT \GRAPE, you can type in

CD ..\GRAPE

since the .. is shorthand for the parent directory (\FRUIT).

But jumping from one deep branch of your subdirectory structure to a completely different branch can be a bad typist's nightmare.

If you're currently logged into

\FRUIT\PEACH

and you want to jump to

\PROGS\STAR\VER3\MEMOS\MERGER

you'd normally have to type in

CD \PROGS\STAR\VER3\MEMOS \MERGER

Awful. But there's a far easier trick. If your hard disk is set up properly, you can simply type

MERGER

and DOS will zap you there.

The trick is to create either a slate of small batch files or one big, big batch file to do all the switching. If you had a batch file called MERGER.BAT on your hard disk, in a subdirectory included in your PATH, with the contents

CD \PROGS\STAR\VER3\MEMOS \MERGER

typing MERGER would execute the batch file, which would in turn execute the proper thorny CD command. This is why it's a good idea to have subdirectories that avoid confusingly similar names.

You can create a new batch file every time you issue an MD to create a new subdirectory. Or you can run one of the programs in Fig 3 and 4. The program in Fig 3, BATMAKR1.BAS, creates lots of small individual batch files. The one in Fig 4, BATMAKR2.BAS, creates one big batch file. Each has its advantages and disadvantages.

It's far faster to have individual batch files, since they execute quickly. But even though each batch file may be only 20 or 30 bytes long, each takes up whatever the minimum cluster size is on your hard disk. On an XT running under DOS 2.x, this is a mind-bending 8k. On an AT under 3.x, it's a more manageable 2k. Put a hundred of these small files on your hard disk and you start chewing up valuable real estate.

The advantage of using one big file is that it takes up far less space. The severe disadvantage is that it executes ponderously slowly. This is because one big batch file has to test your input and match it against all the subdirectories on your disk to see which one to switch to. Batch files execute one slow line at a time, so on a slow XT hard disk the process can take 10 or 20 seconds if the subdirectory you want is at the very bottom of the list of tests. If you are tight for space and want to use the one-big-file method, put a command in your AUTOEXEC.BAT file to copy this subdirectory switcher to a RAMdisk, and run it from there.

The other real advantage of having small individual files is that they're more forgiving about typing mistakes. If you tell the long batch file to switch to a subdirectory that doesn't exist, it has to check the one you entered against its entire list, which means chugging its way one line at a time through every test. And, while the one long batch file does at least check for all uppercase and all lowercase entries, it doesn't test for mixtures of upper-and lowercase. It could handle lowercase user input such as

merger

or uppercase input like

MERGER

but not Merger, or MErger (a common typing mistake) or something like MeRgEr. That's because this method uses replaceable parameters, and DOS retains the case of your typing exactly.

With the individual file technique, you're typing in a command (the name of a file, actually) rather than a replaceable parameter. DOS automatically translates commands into all uppercase for you. You should use the shorter individual system if at all possible.

Both versions work from a list of subdirectories you create by typing

CHKDSK /V > | FIND 'Dir' > TEMPFILE

The /V switch tells CHKDSK to list all the files on your disk, including subdirectories, which are simply files that DOS codes a special way. DOS then pipes the CHKDSK output through its FIND filter, discarding every line that doesn't have the letters 'Dir' in them. This eliminates all conventional files and blank lines, as well as the normal CHKDSK report on the number of hidden files and bytes free.

The longer version creates a single .BAT file to handle all the subdirectory switching. If all you had on your hard disk were a root directory and two subdirectories one level down, \DOS and \BIN, the contents of S.BAT would look something like this:

```
ECHO OFF
IF %1@==@ GOTO ERROR2
IF %1==DOS goto DOS
IF %1==dos goto DOS
IF %1==BIN goto BIN
IF %1==bin goto BIN
GOTO ERROR1
:DOS
CD C:\DOS
GOTO END
```

```
:BIN
CD C:\BIN
GOTO END
:ERROR1
ECHO Subdirectory %1 not found.
ECHO Try again.
GOTO END
:ERROR2
ECHO You must enter a subdirectory
ECHO name after %0
:END
```

Both versions require that you have CHKDSK.COM and FIND.EXE on your current directory, or in a subdirectory that you've included in your PATH. Once you've run the CHKDSK/V command mentioned above, run BATMAKR2.BAS to create the long S.BAT file.

If you enter just the name of the batch file you just created, S, with no subdirectory after it, the

IF %1@==@ GOTO ERROR2

line will jump to the ERROR2 error message. The %0 in this message is a special replaceable parameter that prints the name of the batch file itself in place of the %0. If you change the name of the batch file to something like SWITCH.BAT, this device will handle the new name.

BATMAKR2 automatically creates both a lowercase and an uppercase test. If you entered

S DOS

or

S dos

either would jump the program to the :DOS label. The line immediately following the label switches to the /DOS subdirectory and then jumps the program to the :END label so it exits. There are other faster ways to exit, such a having the batch file execute another short batch file, but the delay isn't all that bad on a RAMdisk, and you really shouldn't run this on anything else.

If you enter a subdirectory name that's not in the list of tests at the beginning of the program, you'll jump to the :ERROR1 label, which uses the %1 replaceable parameter to tell you it couldn't find the directory you specified.

BATMAKR1.BAS in Fig 3 is shorter and creates shorter files that work far faster than the long S. BAT. After you run it, to change to \BIN you'd just have to type BIN.

```
100 'BATMAKR2.BAS
110 'This creates easy subdirectory switcher files
120 ' (And puts them all in one very long file.)
130 'Before you use this, get into DOS and type:
140 '
150 '     chkdsk / v | find "Dir" > tempfile
160 '
170 'For this to work properly, make sure each
180 '     subdirectory has its own unique name.
190 'To switch between subdirectories in DOS, type
200 '     S and then the name of the subdirectory
210 '     WITHOUT the "CD\" prefix, and WITHOUT the
220 '     long PATHname that usually precedes it.
230 'For instance, to switch to \DOS\BIN, type:
240 '     S BIN
250 'DON'T run S.BAT on a floppy disk.  For best
260 '     results, run it on a RAMdisk you've PATHed to.
270 '
280 DIM B$(300),C$(300),F$(300)
290 ON ERROR GOTO 660
300 ' --- read raw file, truncate left end of each line ---
310 OPEN "tempfile" FOR INPUT AS #1
320 IF EOF(1) THEN 430 ELSE LINE INPUT #1,A$
330 B$(K)=RIGHT$(A$,LEN(A$)-10):IF B$(K)="\" THEN 320
340 FOR A=LEN(B$(K)) TO 1 STEP -1
350 IF MID$(B$(K),A,1)="\" THEN C$(K)=RIGHT$(B$(K),LEN(B$(K))-A):GOTO 380
360 NEXT
370 ' --- create lowercase version of each test ---
380 FOR D=1 TO LEN(C$(K))
390 F$(K)=F$(K)+CHR$(ASC(MID$(C$(K),D,1)) OR 32)
400 NEXT
410 K=K+1:GOTO 320
420 ' --- write upper- and lowercase tests to S.BAT ---
430 OPEN "S.BAT" FOR OUTPUT AS #2
440 PRINT #2,"ECHO OFF"
450 PRINT #2,"IF %1@==@ GOTO ERROR2"
460 FOR A=1 TO K-1
470 PRINT #2,"IF %1==";C$(A);" goto ";C$(A)
480 PRINT #2,"IF %1==";F$(A);" goto ";C$(A)
490 NEXT
500 PRINT #2,"GOTO ERROR1"
510 ' --- write actual CD instructions to S.BAT ---
520 FOR A=1 TO K-1
530 PRINT #2,":"+C$(A)
540 PRINT #2,"CD"+CHR$(32)+B$(A)
550 PRINT #2,"GOTO END"
560 NEXT
570 ' --- write error-handling and ending routines to S.BAT ---
580 PRINT #2,":ERROR1"
590 PRINT #2,"ECHO Subdirectory %1 not found.  Try again."
600 PRINT #2,"GOTO END"
610 PRINT #2,":ERROR2"
620 PRINT #2,"ECHO You must enter a subdirectory name after %0"
630 PRINT #2,":END"
640 ' --- cleanup and error routine ---
650 CLOSE:KILL "tempfile.":PRINT:LIST 170-260:END
660 IF ERR=53 THEN LIST 130-150 ELSE ON ERROR GOTO 0
```

Fig 4 BATMAKR2.BAS is designed to create one master S.BAT batch file to switch subdirectories by typing in the subdirectory name after S. Note the difference from BATMKR1.BAS, which creates small individual files. Run S.BAT from a RAMdisk for best performance. Before running BATMAKR2, make sure CHKDSK.COM and FIND.EXE are on your disk (or are in subdirectories you've included in your PATH command) and type CHKDSK/V|FIND"Dir">TEMPFILE

These programs don't offer any fancy way to jump back to the root directory. After all, CD\ isn't that hard to type. And if you're really rabid about, you can always create a ROOT.BAT batch file that executes this for you.

But how do you know what directories are on your disk? Simple. Just redirect the output of VTREE into a file called VTREE.PIC with the command

VTREE>VTREE.PIC

and then create a small batch file call V.BAT:

COPY CON V.BAT
BROWSE VTREE.PIC

Hit the Enter key after each line, and when finished, hit the F6 function key and then the Enter key one more time.

Redirect the output of VTREE into VTREE.PIC every time you create a new subdirectory or remove an existing one. (If you want, you can create another batch file, called UPDATE.BAT, that does this for you and even puts the VTREE.PIC output file into the proper subdirectory.) Then, assuming BROWSE.COM and V.BAT are in a subdirectory that you've included in your PATH, each time you type

V

you'll see an instant graphic representation of your subdirectory tree structure. You can use the cursor and PgUp/PgDn keys to move around in the tree. Hitting Esc will return you to DOS, where you can switch to the target subdirectory by using one of the two BATMAKR methods described above.

If you don't have BROWSE.COM handy and your subdirectory tree is fairly short, you could substitute the command

TYPE VTREE.PIC | MORE

for the line BROWSE VTREE.PK

An even better adaptation of this method is to use SideKick's notepad as a window that display the VTREE.PIC file as the default. Store VTREE.PIC in you \BIN subdirectory. Bring up SideKick's main menu, and type F7 or S for the Setup menu. Type in \BIN\VTREE.PIC as the new Notefile name and hit F2 to save this as the default. Then whenever you pop up SideKick and select the notepad, the graphic representation will jump onto the screen. For best results, hit QG, which turns on the graphics line characters that connect the subdirectories.

Charles Petzold has written three very short utilities, called UP.COM, DOWN.COM and NEXT.COM, that can move you effortlessly around your subdirectory tree. To create these, run the CD.BAS program in Fig 5.

UP.COM is a lot like the command CD.. except that if you keep tapping CD.. you'll eventually get to the root directory and receive the 'Invalid directory' message mentioned earlier. When UP.COM reaches the root directory it just sits there silently.

```
100 ' CD.BAS -- makes C. Petzold's NEXT.COM, DOWN.COM and UP.COM
110 CLS:PRINT "Checking DATA; please wait..."
120 DIM S(12):FOR A=1 TO 12:READ S(A):R=R+S(A):NEXT
130 IF R<>17789 THEN PRINT "ERROR IN LINE 260 -- REDO ":END
140 FOR B=1 TO 12:FOR C=1 TO 16:READ A$:T=T+VAL("&H"+A$):NEXT
150 IF S(B)<>T THEN PRINT "ERROR LINE";B*10+260;" -- REDO":END
160 T=0:NEXT:RESTORE 270
170 OPEN "NEXT.COM" AS #1 LEN=1:FIELD #1,1 AS D$
180 FOR B=1 TO 129:READ A$:LSET D$=CHR$(VAL("&H"+A$)):PUT #1
190 NEXT:CLOSE:PRINT "NEXT.COM CREATED"
200 OPEN "DOWN.COM" AS #1 LEN=1:FIELD #1,1 AS D$
210 FOR B=1 TO 44:READ A$:LSET D$=CHR$(VAL("&H"+A$)):PUT #1
220 NEXT:CLOSE:PRINT "DOWN.COM CREATED"
230 OPEN "UP.COM" AS #1 LEN=1:FIELD #1,1 AS D$
240 FOR B=1 TO 15:READ A$:LSET D$=CHR$(VAL("&H"+A$)):PUT #1
250 NEXT:CLOSE:PRINT "UP.COM CREATED"
260 DATA 934,1655,1762,1501,1530,1326,1391,1902,1195,1758,1839,996
270 DATA EB,0D,90,2E,2E,00,2A,2E,2A,00,81,01,00,00,00,BE
280 DATA 81,01,2A,D2,B4,47,CD,21,80,3E,81,01,00,74,60,FC
290 DATA 2B,C9,AC,0A,C0,74,0D,41,3C,5C,75,F6,2B,C9,89,36
300 DATA 0A,01,EB,EE,89,0E,0C,01,BA,03,01,B4,3B,CD,21,BA
310 DATA 06,01,B9,10,00,B4,4E,CD,21,72,34,B4,4F,F6,06,95
320 DATA 00,10,74,F3,80,3E,9E,00,2E,74,EC,80,3E,0E,01,00
330 DATA 75,16,BE,9E,00,8B,3E,0A,01,8B,0E,0C,01,F3,A6,75
340 DATA D6,C6,06,0E,01,01,EB,CF,BA,9E,00,B4,3B,CD,21,CD
350 DATA 20,EB,05,90,2A,2E,2A,00,BA,03,01,B9,10,00,B4,4E
360 DATA CD,21,72,17,B4,4F,F6,06,95,00,10,74,F3,80,3E,9E
370 DATA 00,2E,74,EC,BA,9E,00,B4,3B,CD,21,CD,20,EB,04,90
380 DATA 2E,2E,00,BA,03,01,B4,3B,CD,21,CD,20,00,00,00,00
```

Fig 5 Charles Petzold's program to create NEXT.COM, DOWN.COM, and UP.COM utilities, which let you navigate easily through your subdirectories

DOWN.COM takes you in the other direction, away from the root. NEXT.COM moves you sideways. Try them. You'll like them. NEXT is especially useful when you type it in the first time and then just lean on the F3 and Enter keys to meander up and down the branches of your subdirectory tree.

Finding your way

While these utilities will make it a breeze to find any subdirectory and jump into it, they don't help you find files in your subdirectories.

You can, of course, create a small batch file call FFIND.BAT:

ECHO OFF
IF %1@==@ GOTO ERROR
CHKDSK / V | FIND '%1'
GOTO END
:ERROR
ECHO You didn't specify a filespec
:END

This short file will launch CHKDSK/V into uncovering every file on your hard disk and filter out every filename that doesn't contain the string of characters that you specified. If you enter

FFIND BAS

FFIND.BAT will print a list of every file that ends in a .BAS extension, as well as any file with the letters 'BAS' anywhere else in the filename, such as BASCOM.LIB or BASEBALL.BAT

But FFIND.BAT is slow, especially on a nearly full hard disk, since it has to pipe hundreds or thousands of filenames through a filter and create temporary files while it does so.

A better choice is to type in the WHERE.BAS program in Fig 6, which will create a file called WHERE.COM. To use WHERE.COM you must follow it with a legal DOS filespec. While FFIND.BAT lets you get away with entering fragments of filenames, WHERE.COM insists on using full and legal filenames

WHERE COMMAND.COM

or wildcards, as in

WHERE * .COM

Fine-tuning your system

While DOS limits the number of files you can shoehorn into the root directory, and smart users know to keep their root directories small, the number of files in each of your subdirectories is limited only by the amount of space on your disk.

But it's not wise to let your subdirectories get too big, unless you have an easy way to back them up.

The DOS BACKUP and RESTORE commands aren't very slick, but they're free and can split large files up and spread them over several disks. You can back up incrementally, by having BACKUP copy only files created or changed after a certain date or modified since the last time you backed up. You can tell BACKUP to dig down into your subdirectory structure and can have it overwrite earlier versions or add the new version along with the old.

But BACKUP should format brand new disks automatically, which it does only in DOS 3.3. And it changes backed-up programs slightly so you can't just run them unless you first RESTORE them. You have to be careful (and use the /P switch) when you're restoring files backed up with earlier DOS versions so you don't write the wrong system files onto your hard disk, though Version 3.3 protects you from this.

Because of all this heartache, many users keep their subdirectories small enough so each can be copied onto a single floppy disk. And they're starting to discover the terrific DOS 3.2 XCOPY command as a better way to create backups. If you worked with large files, you have to either grit your teeth and use BACKUP, or buy a tape drive or Bernoulli Box.

Do get into the habit of backing up regularly. The morning you turn your system on and hear a sound like a wrench in a blender, you'll be glad you did.

Backing up just the files you changed or added recently is better than not backing up at all, but when your hard disk goes down, you'll have to spend days putting all the little puzzle pieces back together. It's a good stopgap measure, but nothing beats making complete archive copies.

A real advantage to backing up every thing at once is that you'll be able to streamline your file structure and end up working far faster. The routine

Booting up with BERNIE

Everyone knows the first thing DOS does after turning itself on is look for a batch file called AUTOEXEC.BAT and try to run it if it's there, right?

Not if it's busy booting BERNIE.

The mechanism that tries to sniff out the existence of a bootup file is buried in COMMAND.COM. This bootup file doesn't have to be called AUTOEXEC.BAT. In fact, it doesn't even have to end in .BAT.

It's easy to change the name of this bootup file to something innocuous like BERNIE. This will prevent others from using the TYPE command to look inside AUTOEXEC.BAT to see what files you use when you start your system. And it will keep all those snoops at bay by displaying a special message designed to confuse. Here's how to do it:

First, make sure you have copies of COMMAND.COM and AUTOEXEC-.BAT stashed safely away, since the process described below alters COMMAND.COM slightly. If you try this and want to put things the way they were, all you'll have to do later is copy your old original COMMAND.COM over the patched one, and then copy it and the original AUTOEXEC.BAT back to the root directory.

Put DEBUG.COM and a copy of COMMAND.COM in your root directory. If you've never used DEBUG.COM before, it's on your Supplemental DOS disk, not the main one. Stupidly, IBM removed DEBUG.COM from DOS Version 3.3.

This process assumes that you normally boot from a system with a C: hard drive, and that you have a subdirectory called C:\DOS. If not, it's pretty simple to figure out how to adapt it.

To get the ball rolling, enter

DEBUG COMMAND.COM

You should see a hyphen at the left edge of your screen. This is the DEBUG prompt. Type

S 100 5000 "AUTO"

and DEBUG should print two pairs of four-digit hexadecimal numbers (hex numbers can be made up of the numerals 0-9 plus the letters A-F), separated by a colon. Ignore the leftmost four digits: they'll vary from system to system and they don't matter here. But note the rightmost four digits; this is where the name \AUTOEXEC.BAT is located inside COMMAND.COM. Now enter

E ** "DOS\BERNIE "**

but substitute those rightmost four digits in place of the ****. For instance, if DEBUG responded earlier with

54BA:130F

after you entered the line beginning with the S, you would enter E 130F "DOS/BERNIE " there.

Note that you must include two blank spaces between BERNIE and the rightmost quote mark. This is because \DOS\BERNIE is two characters shorter than the \AUTOEXEC.BAT that appears inside COMMAND.COM. You have to pad over all existing letters in AUTOEXEC.BAT with spaces if your new name isn't as long.

Then type W, hit the Enter key, type Q, and hit the Enter key.

Finally, copy your AUTOEXEC.BAT routine to your \DOS subdirectory and name it BERNIE, and then delete it from the root directory, with the commands

COPY AUTOEXEC.BAT\DOS\BERNIE
DEL \AUTOEXEC.BAT

You can then create a phony AUTOEXEC.BAT file in your root directory that contains the line

PROMPT Access Denied$_

If another user tries to run AUTOEXEC.BAT, all he'll get is a screenful of

Access Denied

prompts. You can even adapt the above technique to patch COMMAND.COM so that is changes the DIR command most snoops will try to use to see what's on your disk.

Enter

DEBUG COMMAND.COM

and then

s 100 5000 "DIR" 3

(including the 3 is important, since the letters DIR appear in COMMAND.COM several times, but you're looking for the only one that is followed immediately by a 3). DEBUG will print another two pairs of hex numbers that are separated by a colon. Then enter

E * "DUR"**

but again, substitute the four rightmost hex digits for the ****. Then type W and hit the Enter key, then type Q and hit the Enter key, and then reboot. If you type in DIR you'll get a 'Bad command or filename' error. If you type in DUR you'll see your normal directory listing. Remind others using your system that you've changed the DIR command.

A word of caution, though — don't mix versions of COMMAND.COM. DOS checks to make sure the version it dealt with originally is not different from one you're trying to use later. That's why you made copies of your originals before you started — Paul Somerson

END

```
100 ' Program for creating WHERE.COM
110 CLS:PRINT "Checking DATA; please wait..."
120 FOR B=1 TO 27:FOR C=1 TO 16:READ A$:TTL=TTL+VAL("&H"+A$):NEXT
130 READ S:IF S=TTL THEN 150
140 PRINT "DATA ERROR IN LINE";B*10+190;" -- REDO":END
150 TTL=0:NEXT:RESTORE
160 OPEN "WHERE.COM" AS #1 LEN=1:FIELD #1,1 AS D$
170 FOR B=1 TO 27:FOR C=1 TO 16:READ A$
180 LSET D$=CHR$(VAL("&H"+A$)):PUT #1:NEXT:READ DUMMY$:NEXT
190 CLOSE:PRINT "WHERE.COM CREATED"
200 DATA FC,BF,79,02,BE,81,00,AC,3C,0D,74,1E,3C,20,76,F7,1733
210 DATA 80,3E,5C,00,00,74,06,AC,AC,3C,20,76,06,AA,AC,3C,1366
220 DATA 20,77,FA,A0,5C,00,0A,C0,75,06,B4,19,CD,21,FE,C0,1867
230 DATA 00,06,27,02,BA,76,02,BB,2A,02,E8,16,00,80,3E,86,1162
240 DATA 02,FF,75,0D,BB,02,00,B9,1A,00,B4,40,BA,87,02,CD,1559
250 DATA 21,CD,20,52,BE,79,02,E8,86,00,33,C9,E8,60,00,72,1725
260 DATA 0D,E8,85,00,E8,6D,00,72,05,E8,7D,00,EB,F6,5A,52,1848
270 DATA BE,23,02,E8,6A,00,B9,10,00,E8,43,00,72,3F,8B,F2,1623
280 DATA F6,44,15,10,75,0D,E8,4B,00,72,32,8B,F2,F6,44,15,1668
290 DATA 10,74,F3,80,7C,1E,2E,74,ED,57,53,8B,F2,83,C6,1E,1966
300 DATA 8B,FB,AC,AA,0A,C0,75,FA,8B,DF,AA,C6,47,FF,5C,E8,2681
310 DATA A1,FF,5B,5F,C6,07,00,B4,1A,CD,21,EB,C9,5A,C3,51,2053
320 DATA 83,C2,2C,B4,1A,CD,21,8B,EA,B4,4E,BA,27,02,CD,21,1909
330 DATA 8B,D5,59,C3,8B,EA,B4,4F,BA,27,02,CD,21,8B,D5,C3,2280
340 DATA 8B,FB,AC,AA,0A,C0,75,FA,C3,8B,EA,80,7E,1E,2E,74,2315
350 DATA 22,BA,27,02,32,C0,A2,86,02,86,07,97,E8,15,00,97,1497
360 DATA 88,07,8B,D5,83,C2,1E,E8,0A,00,B4,09,BA,9F,02,CD,1833
370 DATA 21,8B,D5,C3,8B,F2,B4,02,AC,8A,D0,CD,21,AC,0A,C0,2273
380 DATA 75,F7,C3,2A,2E,2A,00,40,3A,5C,00,00,00,00,00,00,903
390 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,0
400 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,0
410 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,0
420 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,0
430 DATA 00,00,00,00,00,00,00,00,00,2A,2E,2A,00,00,00,00,130
440 DATA 00,00,00,00,00,00,FF,4E,6F,20,6D,61,74,63,68,69,1106
450 DATA 6E,67,20,66,69,6C,65,73,20,66,6F,75,6E,64,2E,0D,1407
460 DATA 0A,24,00,00,00,00,00,00,00,00,00,00,00,00,00,00,46
```

Fig 6 Program to create WHERE.COM file finder

process of adding to and editing down your files each day ends up sowing little file fragments more or less at random over the surface of your disk.

You should periodically copy all your files to a backup medium (and get rid of the duplicates, .BAK versions, and dead data in the process), reformat your hard disk, and then copy everything back. You'll notice an immediate improvement in speed. When you do this, put the subdirectories that you PATH to at the very beginning of your directory by making sure they're the first ones you copy to the newly formatted disk.

One final pearl of wisdom is obvious but bears repeating. Think before you FORMAT. Even though the latest versions of DOS make you type in a Y and then hit the Enter key before letting it go ahead and wipe everything out, late at night you may misinterpret the question or hit a Y when you mean N, or have some aberrant and lethal combination of JOIN, APPEND, and SUBST bubbling away under the surface that steers an innocent floppy request into a jolt of panic. A few seconds into the formatting process the hard disk FATs and directories get zeroed out, any attempt at resurrection is only a best guess. It is possible to bring much of your data back to life with a utility like Mace's or Norton's, especially if you let Mace park a copy of your FAT ahead of time. But don't tempt fate.

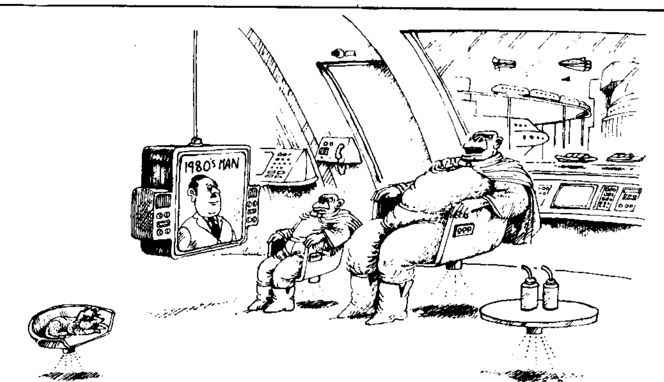
If you're working on something time sensitive and critically important, stop

'One final pearl of wisdom is obvious but bears repeating. Think before you FORMAT.'

frequently while you're working and make a working copy on a floppy. It is possible to corrupt a hard disk if your writing to it and the electricity commission decides that moment would be a good one to switch generators. You can set up a batch file to automate the process. Otherwise you might end up spending the rest of the evening patching together little shards of your work that you've fished out of the magnetic murk.

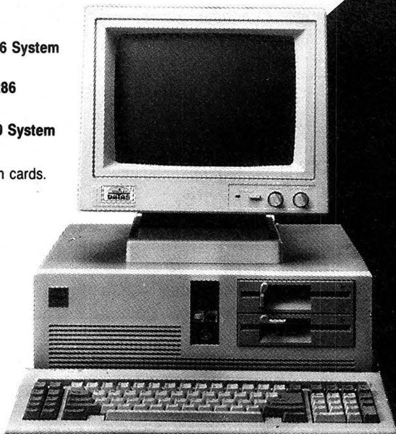
If you notice that performance is degrading, or hear the percussive rhythm of repeated read retries, run Norton's DISKTEST program. This takes a few minutes, but can ferret out developing programs and zap out bad sectors better than DOS can. And if the Norton program reports grief, back up everything pronto and dive down to your dealer. When hard disks start whimpering, they go downhill very fast. Hard disk problems never just go away.

END



'It's nature's way of adapting, son. Now that computers do all our brainwork we don't need such big heads.'

Our name ENCOM INTERNATIONAL (Enhanced Computers) is your GUARANTEE to keep you always ONE STEP AHEAD of the LATEST TECHNOLOGY.



Our range includes:

- **ECCEL PRO-386: 16MHz 80386 System** (Norton SI = 18.7)
- **ECCEL AT-FLASH: 12MHz 80286 System** (Norton SI = 13.3)
- **ECCEL XT-BABY: 10MHz V-20 System** (Norton SI = 7.7)
- Full range of standard Add-On cards.
- Largest range of Enhanced Add-On cards.

We are specialists in:

- Small order manufacture
- Special systems-made to your spec.

Your reasons to buy from us:

- Longest Warranty — 2 years unconditional
- Highest Quality — Minimum 72 hours burn-in test
- Fast Delievery — within 10 days from receipt of order
- Competitive Price — Best "value-for-money" deal in Taiwan
- Customer Support — we are engineers & our native tongue is ENGLISH

ENCOM

OEM & AGENTS WANTED

WE ARE AN AUSTRALIAN COMPANY

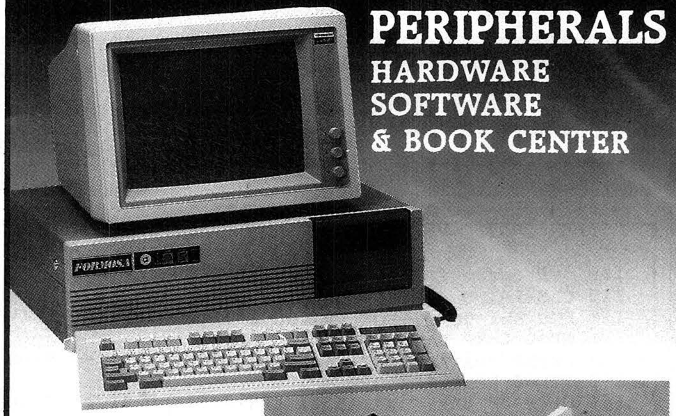
ENCOM INTERNATIONAL CO., LTD.

Head Office: 8F-6, No. 46, Min-Sheng E. Road. Taipei, Taiwan, R.O.C.

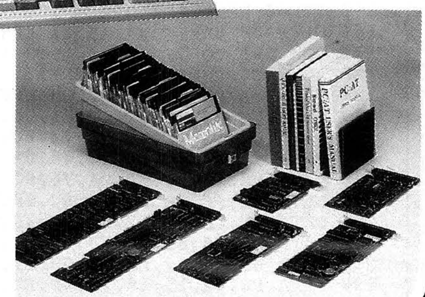
Tel: (02)521-3902 521-4410 Telex: 29640 ENCOM

PERSONAL COMPUTERS & PERIPHERALS

HARDWARE SOFTWARE & BOOK CENTER



We are specializing in Apple II and IBM PC/XT/AT compatible products.



Write us today for catalogue

FORMOSA L&M ENTERPRISE CO., LTD.

P.O. Box 27 Taipei, Taiwan, R.O.C.

Telex: 10760 LFORMOSA

Cable Address: "I FORMOSA" TAIPEI

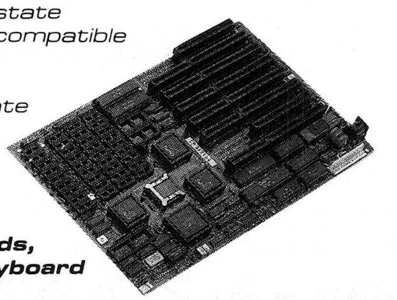
RELIABLE QUALITY from SANWEL

New Board Coming Soon!!

286 16MHz PC/AT Compatible System with 386 Speed

6/10MHz 0/1 wait state standard/baby AT compatible system

6/12MHz 1 wait state standard/baby AT compatible system



Also all add-on cards, power supplies, keyboard and much more...

Manufacturer & Exporter:

SANWEL-COMP ENTERPRISE CO., LTD.

P.O. BOX 7-586, Taipei, Taiwan, R.O.C.

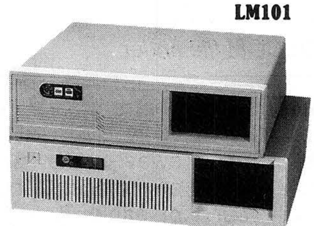
TEL: (02)7682170-1, 7660884

TELEX: 14618 SANWEL FAX: 001-886-2-7663346

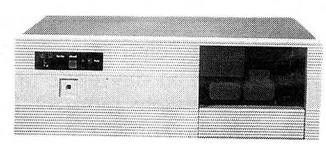
QUALITY AND PRICE YOU CAN BANK ON!

COMPUTER CASE FOR AT/XT COMPATIBLES

LM101



LM301



LM401

COMPUTER CASE FOR XT/MINI AT/AT COMPATIBLES

- 1.2mm HEAVY GAUGE STEEL.
- NICKEL PLATED.
- SCRATCH-RESISTANT PAINT.
- INSULATED SURFACE TREATMENT.
- UNIMEC MODULAR SWITCH, DEMARK.(OPTION)
- MEET FCC REQUIREMENTS.
- EASY TO INSTALL.

LM301 (BABY AT):

- SIZE: 420(L) x 440(W) x 156(H) mm.
- WEIGHT: N.W.: 7.5KG
  G.W.: 8.5KG
- 2 FDD, 1 HDD (1 3-1/2" HDD OPTIONAL).
- 8 EXPANSION SLOTS.
- FOR BOTH XT AND AT.

NEW UNIVERSAL CASE FOR BOTH 5¼" AND 3½" FDD ARE COMING IN NEXT MONTH!

LEE MIN INDUSTRY CO., LTD.

P.O.BOX 13-67 PAN CHIAO, TAIPEI HSIEN, TAIWAN, R.O.C.

TEL: (02)261-6922/3 TELEX: 33332 LEEMIN

CABLE: "LEEMIN" TAIPEI TELEFAX: 886-2-2619969

DIARY DATA

Readers are strongly advised to check details with exhibition organisers before making travel arrangements to avoid wasted journeys due to cancellations, printers' errors, etc.

Melbourne	PC87-The Ninth Australian Personal Computer Show also incorporating Office Technology '87 and Communications '87 Australian Exhibition Services Suite 3.3, 424 St Kilda Road Melbourne Vic 3004 (03) 267 4500	May 31-June 3, 1987
Atlanta	The Seventh Annual Comdex/Spring at the Georgia World Congress Centre in Atlanta Contact: (02) 959 5555	June 1-4, 1987
Taipei	Computex Taipei Contact: 201 Tunhwa North Road, Taipei 10591 (02) 715 1515	June 8-14, 1987
Chicago	NCC '87 Contact: American Federation of Information Processing Societies 1899 Preston White Drive Reston, Virginia 2209 (703) 620 8955	June 15-18, 1987
Melbourne	Comnet '87	July 1-2, 1987
Sydney	Contact: Stephen	July 6-7, 1987
Auckland	Moore, Karen Rickwood	July, 9-10, 1987
Perth	(02) 439 5133	July 15-16, 1987
Adelaide	Comtec '87 Contact: Comtec Administration Office, 112 Magill Road, Norwood SA 5067 (08) 42 9093	August 3-5, 1987
Sydney	Macworld Expo '87 Contact: Stephen Moore, Karen Rickwood, (02) 439 5133	August 3-5, 1987
Sydney	Comdex '87 TIG Australia Inc. 8 West Street, North Sydney NSW 2060 (02) 959 5555	August 19-21, 1987

NUMBERS COUNT

Mike Mudge continues his investigation into W-Sequences

In the May 'Numbers Count' the definition and origin of W-Sequences appeared together with a number of simple problems. For completeness the definition is reproduced here and a further, independent set of problems is then formulated.

The Definition of a W-Sequence

Consider five positive integers a,b,c,d_1 and d_2 satisfying $2<=a<=b$, $c>=0, d_1 . d_2 \neq 0$

The sequence $W(a,b,c,d_1 d_2)$ is defined by the following rules:

(i) The first term $W_1 = c$.

(ii) The even terms $W_{2n} = aW_n + d_1$.

(iii) The odd terms (other than the first defined at (i) above)

$W_{2n+1} = bW_n + d_2$.

(iv) The sequence calculated as above is *then* rearranged so that the terms are in increasing numerical order. Thus in general the subscripts n will no longer be in numerical order.

Note: If $d_1 = d_2 = 1$ we write W(a,b,c) and if further c = 1 we write W(a,b). For an example of a W— Sequence see last month's column for detailed calculation.

W(2,3,1): 1, 3, 4, 7, 9, 10, 13, 15, 19, 21, 22, 27, 28, 31, 39, 40 . . .

W(2,3,2): 2, 5, 7, 11, 15, 16, 22, 23, 31, 33, 34, 45, 46, 47, 49, 63 . . .

W(2,3,7): 7, 15, 22, 31, 45, 46, 63, 67, 91, 93, 94, 127, 135, 136 . . .

Revision Note

Two positive integers A and B are said to be CONGRUENT MODULO a third positive integer C if and only if they leave the same remainder when divided by C, thus A — B must be an integer multiple of C.

We write $A \equiv B$ (mod C) and understand that there exists a positive integer k such that A — B = kC where it is assumed that A>=B.

Problem I

What values may W(a,b) take modulo any given integer?

Hint. Produce a chart expressing the values of W(a,b) (mod ab) as a percentage for values 2<=a<b<=9. Where the values to be charted are the RESIDUES MODULO ab — that is: the remainders upon division by ab.

Extend the chart as far as practicable. For example: 2<=a<b<=50.

Extend the results to include W(a,b,c) (mod ab) for 1<=c<=ab.

Problem II

What proportion of the terms of a W-Sequence are congruent to each of the possible residues modulo N?

Hint. Determine the proportion of the terms of W(2,3,1) which are congruent to each of 0,1,2 and 3 modulo 4 at intervals of, say, 20000.

Determine the proportion of the terms of W(2,3,1) congruent to each possible residue modulo 100 at intervals of, say, 20000.

Repeat each of the above for W(2,3,2) and then turn the investigation to W(6,9) modulo 54 at intervals of, say, 100000.

Why is it only necessary to consider 7, 10, 37 and 43 as possible residues?

Problem III

For what distinct values of c is a given N a term in $W(a,b,c,d_1,d_2)$ when a,b,d_1 and d_2 are specified?

Problem IV

What terms are common to $W(a_1,b_1,c_1)$ and $W(a_2,b_2,c_2)$ and are these terms all in $W(a_3,b_3,c_3)$ for some suitable choice of the parameters?

Hint. Examine the case of W(2,3,1); W(2,3,2) and W(2,3,7) for which a few terms are given above.

Readers are encouraged to send their thoughts, together with complete or partial attempts at the solutions to the above problems, to Mike Mudge, C/- *APC*, 2nd Floor, 215 Clarence Street, Sydney 2000, by July 15, 1987.

It would be appreciated if such submissions contained a brief summary of results together with thoughts relating to these problems, in a form suitable for future publication in *APC*.

Please note that submissions can only be returned if a stamped addressed envelope is provided.

Mike Mudge welcomes correspondence on any subject within the areas of number theory and other computational mathematics. Particularly welcome are suggestions, either general or particular, for future 'Numbers Count' articles.

Review: December '86

The postage stamp problem attracted a wide spectrum of readers.

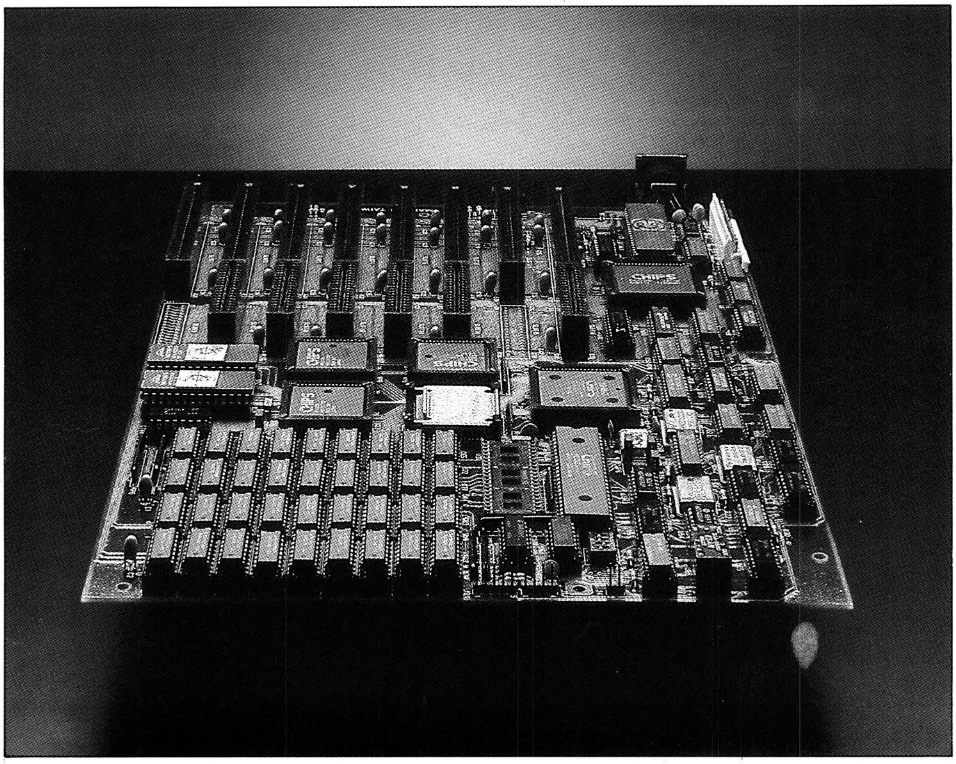
Readable, but slightly out of date references include: *A Postage Stamp Problem* by Ronald Alter and Jeffrey Barnett (American Mathematical Monthly, March 1980, pp206-210) with a further 47 references; *Algorithms for Computing the h-Range of the Postage Stamp Problem* by Svein Mossige (from Bergen) (Mathematics of Computation, vol 36, no 154, April 1981 pp 575- 582); and *Unsolved Problems in Number Theory,* by Springer Verlag 1980, p68-70.

Within the spirit of The Numbers Count column and its associated vague criteria, this month's prizewinner is Peter Cameron. Included in Peter's results is a table of n(s,3) for s<=50 compared with the upper and lower Hofmeister Bounds and Guy's conjectured value.

Readers should note that Guy's Conjecture is now, in fact, a proven result.

END

THE REMARKABLE BABY



TAM-10C SUPER BABY AT MAINBOARD

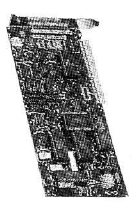
- ■ 6/8/10/12 MHz Software and Hardware Switchable
- □ 80286-8 or 80286-10 CPU
- ■ 6 Chip Sets
- ■ 384K RAM Disk
- □ Hard Reset Jumper
- □ 7 Channel D.M.A.
- □ 16 Level Interrupt
- □ Clock w/Battery
- □ Maximum 1 MB Memory
- □ 8 I/O Slots

PREVIOUS ELECTRONICS CO., LTD.

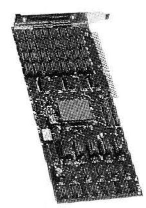
P.O. Box 12-18, Hsintien City,
Taipei, Taiwan, R.O.C.
Telex: 33455 PREVIOUS
Tel: (02)917-2053

IBM PC/AT/XT are registered trademarks of the IBM Corp.

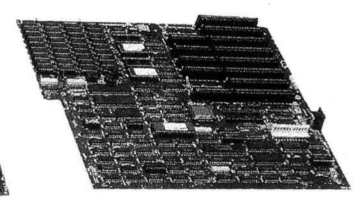
A Magnificent Choice of PC from Amptron



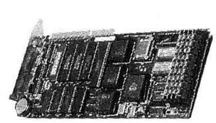
HFC CARD



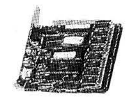
CARD AT



4MB AT M/B



SPEED 386



EGA SHORT CARD

Amptron offers a full line of "PACKAGE" service for personal computer, include:

1. **COMPac: PC/XT/AT compatible complete system/S.K.D.**
2. **EGAPac: EGA Monitor (640x350) and EGA adapters**
3. **APac: Video, multi I/O, disk/tape controller, multifunction full series of add-on cards.**
4. **LINPac: LAN, Modem, data switch box**

AMPOC FAR-EAST CO., LTD.

99, Ning Po W. Street, Taipei, Taiwan, ROC
Telex: 23893 AMPOTIN
Fax: (02)3070171
Tel: (02)3055935-9

LAZING AROUND

Quickie
A boy and a girl are talking. 'I'm a boy,' said A. 'I'm a girl,' said B. If at least one is lying, which is the boy and which is the girl? Think about it.

Prize puzzle
My credit card number is rather unusual. Its value is the sum of the squares of three consecutive integers. Only four of the digits 0-9 are used in its makeup, and these appear consecutively as the last four digits of the number. It is the smallest possible number to satisfy these conditions and there are no leading zeros. What is it?

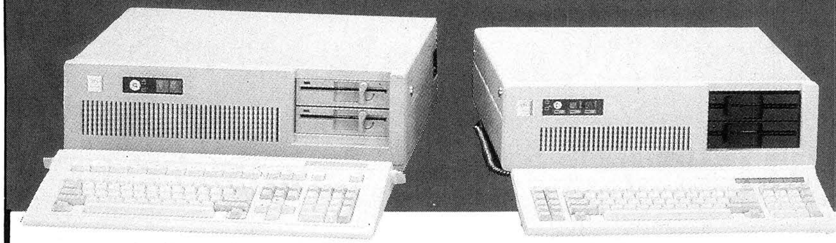
(By the way, if you solve it — please don't use it — I'm already in the red!)

Answers on postcards please, or backs of envelopes, to reach *APC* no later that 30 June 1987. Send your entries to Lazing Around June, 2nd Floor, 215 Clarence Street, Sydney, 2000.

Winner: March 1987 puzzle
A low response indicating a harder than usual problem. However, the problem was worded ambiguously. We intended to ask for the smallest integer that could be expressed in exactly 10 different ways, as the sum of a succession of consecutive integers. The answer to this problem is 59049.

Unfortunately, we omitted the word 'exactly' and the answer of 315 can be expressed in 11 different ways. In the interests of fairness, therefore, we accepted either solution. Incidentally, most of the correct entries contained both solutions to cover the ambiguity.

The winning entry came from Kieron Curtis of Ingle Farm, SA. Congratulations, Kieron, your prize is on its way. Meanwhile, to all the unlucky ones, keep trying.



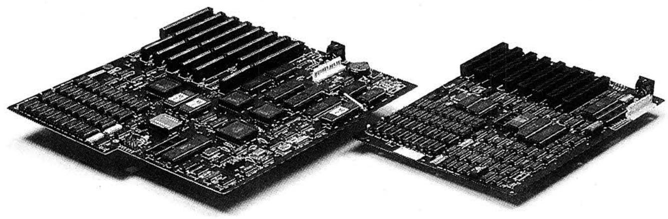
SUPERIOR QUALITY, FINEST WORKMANSHIP, COMPETITIVE PRICE ITI - AT YOUR SERVICE

ITI-2000 TURBO AT 12MHz (fully IBM PC/AT compatible)

ITI-8010 TURBO XT 10MHz (fully IBM PC/XT compatible)

CPU-2000 AT main board

CPU-8010 XT main board



We also supply peripherals & add-on cards

ITI

OEM & DISTRIBUTORS ARE WELCOME!!

INTELL-TRONIC INDUSTRIAL CO., LTD.

6F-2, No. 236, Fu Hsing S. Rd., Sec. 2, Taipei, Taiwan, R.O.C.
Telex: 29932 ENTERITI Fax: 886-2-708-0925 Tel: (02) 701-9054

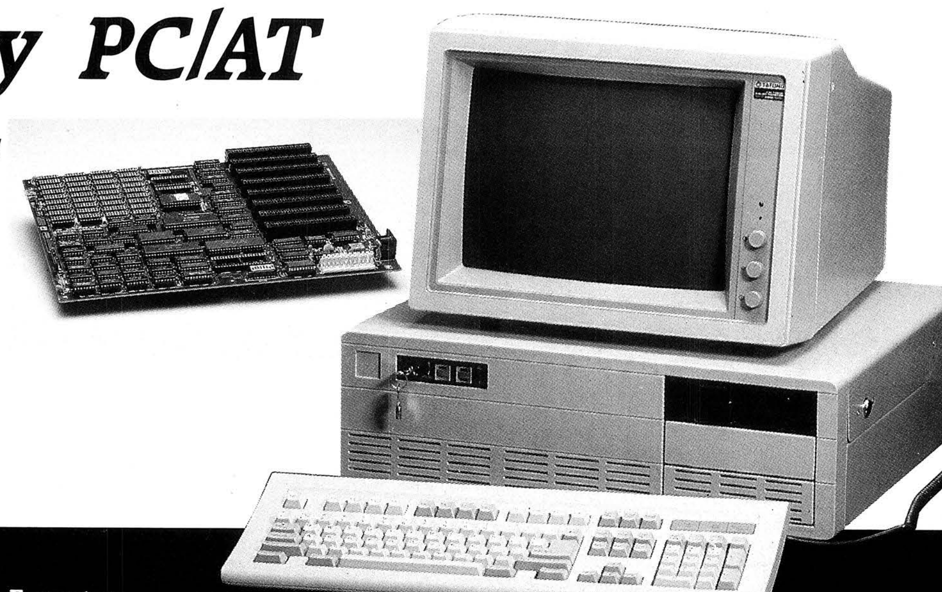
ITI-2000 TURBO AT 12MHz

- CUP 80286-10 with 6/12 MHz, 80287 optional
- I MB RAM with 8 expansion slots
- 360K/1.2MB FDD, 20MB/40MB HDD,
- 200W switching power supply (FCC approved)
- System clock & battery backup
- Serial & parallel adapter
- HDD/FDD controller
- M/G/P, C/G/A, or EGA display card
- O/S: MS DOS 3.1, 3.2

ITI-8010 TURBO XT 10MHz

- CPU 8088-2 with 4.77/10MHz, 8087 optional
- 640K RAM with 8 expansion slots
- Multi I/O card
- 360K FDD, 20MB HDD
- Mechanical Type keyboard (FCC approved)
- 150W switching power supply (FCC approved)
- M/G/P, C/G/A, or EGA display card
- Flip-top case with keylock, LED indicator for Turbo & Power on
- O/S: MS DOS 3.1, 3.2

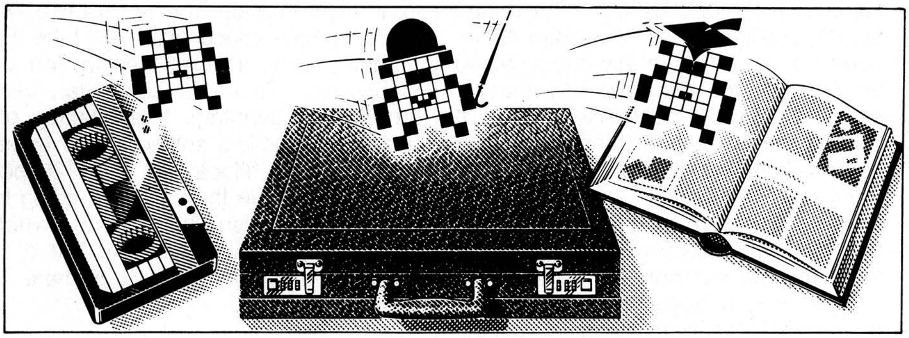
10MHz XT Turbo & Super-Baby PC/AT



* *6/8/10 MHz Turbo Main Board baby AT 6/10/12 MHz Main Board*
* *Enhanced Graphics Adaptor (Hercules)*
* *1.2 MB Floppy Disk Controller*
* *Hard/Floppy disk Controller*
* *Serial/Parallel Card*
* *Multi-serial Card*
* *Hard Disk Drive 10/20/30/40MB*
* *Floppy disk Drive 360K/1.2MB*
* *Keyboard 84 or 101 Keys*
* *Case (Flip Top or slide-in)*
* *Monitor*
* *Power Supply*

Manufacturer & Exporter
VIGOR SYSTEMS CORP.

2Fl., No. 56, Lane 669, Tunhwa South Rd. Taipei, Taiwan, R.O.C.
Tel: (02) 776-2462, 776-2463 Telex: 29967 VIGOROOS Fax: 886-2-709-8845



- *Games*
- *Scientific/mathematic*
- *Business*
- *Toolkit/utilities*
- *Educational/Computer Aided Learning*

Making a hash of it

Owen Linderholm describes the advantages of hashing, and selects the best of this month's programs. For details on submitting your own, see the box below.

This month's programming technique, hashing, is essentially a quick method of indexing a large number of data items so that they can be found extremely quickly. The technique is useful because it is a relatively simple searching technique which is very fast, even with large amounts of data. Its problems are that space needs to be allocated in advance for storage; it is rather limited; and problems can occur with 'worst case' situations.

Hashing is particularly useful in languages like Basic where advanced data structures are not implemented. It provides a useful way of storing data in arrays in such a way that it can be retrieved easily. If you are storing information in an array and have to look through the information to find certain items, there are two standard techniques. If time isn't a problem, you can simply look through all the elements in the array one after another. Alternatively, you can sort all the elements when you insert new ones so that you can find items in the array immediately. This method involves lots of repositioning of old items to make space.

Hashing gets around this. Every data item is generated a simple code by a 'hashing algorithm'; the string is then inserted in the array at the point indicated by this code. The code needs to be generated in such a way that it produces a number that fits inside the array, and is different for each string or data item. This often turns out to be impossible, so some kind of 're-hashsing' algorithm is required to produce another code if there is a clash.

Simple strings

This may all sound rather complicated, but I'll try to explain it using a simple string example. It's a good idea with hashing techniques to use data areas which are a prime number in size, because prime numbers can be used to produce well-scattered hash values. Many people have spent months of research on this problem and it isn't easy to summarise a solution. For this example I'll use a string array of 67 elements, so assume that there is an array created by DIM DTA$(67) to hold ordinary Basic strings of any length.

The hashing algorithm to be used is to add up all the ASCII values of the characters in the string and then take the modulus with 67 (hashval=asciitotal MOD67). If there is already a data item present with that hash value and rehashing is necessary, then repeat the following formula until an empty space is found:

newhashval=(oldhashval+secondhashval)MOD 67, where secondhashval=67-2-(asciitotal MOD 65).

This algorithm may seem longwinded and contrived, but is in fact based on research on hashing algorithms and is one of the most efficient methods that can be used.

Initially three strings, 'SmithJ' 'SmithL' and 'SmithK' are entered and are to be

APC is interested in programs written in any of the major programming languages for all home and small business micros. When submitting programs please include a cassette or disk version of your program, brief but comprehensive documentation, and a listing on plain white paper — typed if you have no printer. Please ensure that the software itself, the documentation and the listing are all marked with your name, address, program title, machine (along with any minimum requirements) and — if possible — a daytime phone number.

Check through the previous Program Files to see the kind of programs we prefer. As a rough guide, original ideas are always welcome, as are good implementations of utilities and applications. Obviously the programs should be well-written, easy to understand, and preferably not too long (remember that other readers have to type them in). All programs should be fully debugged and your own original, un*published work. We prefer to receive programs with a maximum 80-column width printed in emphasised typeface. If possible, please include printed sample output.*

We will try to return submissions if they are accompanied by a stamped, addressed envelope of the appropriate size, but please keep a copy of everything. Programs are paid for at the rate of $50 per page of published listing.

Send your contributions to Program File, *APC*, 77 Glenhuntly Road, Elwood 3184.

put into the array using hashing. Firstly, the string SmithJ is hashed. The total ASCII value is 83+109 +105+116+104=517, so the hash value is 517 MOD 67 which is 55. Therefore, DTA$(55) is set to SmithJ (DTA$(55)=SmithJ). Similarly, the string SmithL is hashed and the value is 57, so DTA$(57) is set to SmithL. Finally, SmithK is hashed and inserted at DTA$(56) — easy so far isn't it!

If you now want to search the data array to see if the string SmithL is there, you calculate the hash value — 57 — and look there. But what if there is nothing there? In this case, SmithL is not among the data. What if there is another string there? You will have to keep looking by doing a re-hash. Let's try it.

We want to insert the simple string 'z' in the array. This produces a hash value of 56 (123 MOD 67), the same as SmithK, so we have to put it somewhere else. The re-hash algorithm is applied. The ASCII value of the string 'z' is 123, so the second hashvalue is 67-2-(123 MOD 65) which is 7. Now the new hashvalue is (56+7) MOD 67, which is 63, so 'z' is inserted at DTA $(63)(Fig 1).

If we now search the array for the string 'z', the first place we look is at the first hashvalue — 56. This is occupied by SmithK so we re-hash and get 63, and there is 'z'. If we had *not* inserted 'z' earlier, then this space would be empty and we could say that 'z' wasn't among the data. Alternatively, if 63 contained another string, we would have to keep rehashing until we found 'z' or an empty space.

This may seem unnecessarily complex, but in practice it is a lot quicker than continually re-sorting the data.

There is one major drawback. What happens if the data array is almost full? Suppose that there are only 7 spaces left out of the 67 — there is a very slight chance that the routine will find an empty space *and* it will take the rehash routine several tries to find an empty slot. This can completely ruin the speed advantage that hashing offers. The practical solution is to make sure you can allocate at least 20 per cent more space than you are going to need. Hashing isn't a good idea when memory space is important, but it is the best technique to use if there is memory to spare.

	ASCII Total	Initial hash value	Rehash value
SmithJ	591	55	-
SmithK	592	56	-
SmithL	593	57	-
z	123	56	63

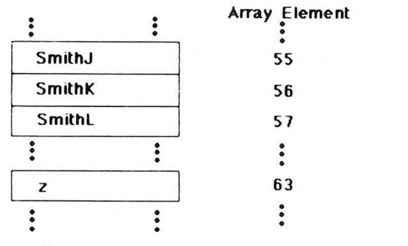


Fig 1

Conclusion

The Basic program example implements the above hashing and rehashing technique for an array of strings, and provides simple insertion and searching. The actual algorithm used in hashing is extremely important, to avoid clashes and repetitions (continually looking in the same place). More information on hashing can be found in the excellent book *Algorithms* by Robert Sedgewick, published by Addison Wesley. Other good sources are Knuth's three volumes *The Art of Computer Programming,* also published by Addison Wesley; and *Data Structures and Algorithms* by Aho, Hopcroft and Ullman, published by — you guessed it — Addison Wesley.

```
        REM/MAIN CONTROL PROGRAM FOR HASHING. SETS UP STRING ARRAY
        REM/THEN CALLS INPUT CONTROL ROUTINE REPEATEDLY
        REM/VARIABLES USED:
        REM/    DTA$(..) - ARRAY TO HOLD STRING ITEMS
        REM/    C$ - COMMAND STRING
        REM/    X$ - DATA STRING TO INSERT OR LOOK FOR
        REM/    EM$ - MESSAGE STRING
        REM/    EMPTY - REACHED EMPTY SPACE IN ARRAY FLAG
        REM/    FOUND - FOUND ITEM IN ARRAY FLAG
        REM/    H1 - CURRENT HASHVALUE
        REM/    H2 - SECOND HASHVALUE FOR REHASHING
        REM/    AST - ASCII TOTAL FOR CURRENT STRING
   1000 DIM DTA$(66)
        REM/SET UP ARRAY WITH 67 ELEMENTS (66+1 FOR ELT. 0)
   1010 FOR X=0 TO 66:DTA$(X)=CHR$(255):NEXT X
        REM/FILL ARRAY WITH 'EMPTY' CHARACTER
   1020 GOSUB 1100:GOTO 1020
        REM/REPEAT INPUT

        REM/INPUT ROUTINE - GETS COMMAND, THEN STRING AND CALLS THE
        REM/APPROPRIATE ROUTINE
   1100 PRINT"Enter command - (S)earch or (I)nsert: ";
   1120 INPUT C$:IF (C$<>"S") AND (C$<>"I") THEN EM$="Invalid command":
        GOSUB 2000:GOTO 1100
   1130 PRINT"Enter string: ";:INPUT X$
   1140 IF C$="S" THEN GOSUB 1300
   1150 IF C$="I" THEN GOSUB 1200
   1160 RETURN

        REM/INSERTION ROUTINE. IT CALLS THE HASHING CONTROL ROUTINE
        REM/TO CHECK ON HASHVALUES. IF THE STRING IS ALREADY IN THE
        REM/ARRAY, THEN THE FOUND FLAG WILL HAVE BEEN SET, SO THE
        REM/MESSAGE 'ITEM ALREADY THERE' WILL BE DISPLAYED. OTHERWISE
        REM/AN EMPTY SPACE WILL HAVE BEEN FOUND AND THE STRING CAN BE
        REM/INSERTED. THE ONLY OTHER POSSIBILITY IS IF THE ARRAY IS FULL
        REM/THEN THE HASHING ROUTINE WILL GO INTO AN INDEFINITE LOOP,
        REM/UNABLE TO FIND A FREE SPACE.
   1200 GOSUB 1400
   1210 IF FOUND=1 THEN EM$="Item already there":GOSUB 2000:RETURN
   1220 IF EMPTY=1 THEN DTA$(H1)=X$
   1230 RETURN

        REM/THE SEARCH ROUTINE. THIS OPERATES SIMILARLY TO THE INSERT
        REM/ROUTINE EXCEPT THAT IF AN ITEM IS FOUND, A MESSAGE IS
        REM/PRINTED OUT ALONG WITH THE HASH VALUE/POSITION IN ARRAY.
   1300 GOSUB 1400
   1310 IF FOUND=1 THEN EM$="Item found at position: "+STR$(H1):
        GOSUB 2000:RETURN
   1320 IF EMPTY=1 THEN EM$="Item not there":GOSUB 2000
   1330 RETURN

        REM/HASH CONTROL ROUTINE. THIS REPEATS THE HASHING AND REHASHING
        REM/ROUTINES UNTIL EITHER FOUND IS TRUE OR EMPTY IS TRUE. THIS
        REM/IS DONE BY FIRST CALLING THE ASCII TOTAL ROUTINE. THEN THE
        REM/INITIAL HASHING ROUTINE IS CALLED. NEXT, THE LOOKUP ROUTINE
        REM/IS CALLED TO CHECK THE ENTRY IN THE ARRAY AT THE CURRENT
        REM/HASHVALUE. IF FOUND OR EMPTY ARE SET, THEN THE ROUTINE
        REM/ENDS, OTHERWISE THE REHASH ROUTINE IS CALLED AND THIS
        REM/ROUTINE LOOPS BACK TO CALLING THE LOOKUP ROUTINE.
   1400 GOSUB 1900    :REM/CALL ASCII TOTAL
   1410 GOSUB 1800    :REM/CALL HASH
   1420 GOSUB 1500    :REM/CALL LOOKUP
   1430 IF FOUND=1 THEN RETURN     :REM/IF FOUND END
   1440 IF EMPTY=1 THEN RETURN     :REM/IF EMPTY END
   1450 GOSUB 1600    :REM/CALL REHASH
   1460 GOTO 1420     :REM/LOOP BACK TO CALL LOOKUP
   1470 RETURN

        REM/LOOKUP ROUTINE. THIS CHECKS THE CONTENTS OF THE ARRAY AT
        REM/THE CURRENT HASHVALUE POSITION
   1500 FOUND=0:EMPTY=0                 :REM/INITIALISE FLAGS
   1510 IF DTA$(H1)=X$ THEN FOUND=1     :REM/IF ITEM ALREADY THERE SET FOUND
   1520 IF DTA$(H1)=CHR$(255) THEN EMPTY=1 :REM/IF NO ITEM THERE SET EMPTY
   1530 RETURN

        REM/REHASH ROUTINE. CALLS CALCULATE SECOND HASHVALUE AND
        REM/CALCULATES THE NEW HASHVALUE
   1600 GOSUB 1700                      :REM/CALL SECOND HASHVALUE
   1610 H1=(H1+H2) MOD 67:RETURN

        REM/SECONDHASH ROUTINE
   1700 H2=67-2-(AST MOD 65):RETURN

        REM/HASH ROUTINE
   1800 H1=AST MOD 67

        REM/ASCII TOTAL ROUTINE. ADDS UP THE ASCII VALUES OF THE
        REM/CHARACTERS IN THE CURRENT STRING
   1900 AST=0
   1910 FOR I=1 TO LEN(X$):AST=AST+ASC(MID$(X$,I,1)):NEXT I
   1920 RETURN

        REM/OUTPUT MESSAGE ROUTINE
   2000 PRINT:PRINT
   2010 PRINT EM$
   2020 BEEP
   2030 RETURN
```

Amstrad CPC Large Printing Tip

by Vaclav Skala

This short program shows just how easy it is to create simple, large banners by printing characters several times. The character shapes are obtained from the character definitions in ROM.

```
10 INPUT a$
20 CLS
30 GOSUB 100
40 GOTO 10
100 SYMBOL AFTER 0
110 N=LEN(a$)
120 IF N=0 THEN RETURN
130 FOR j=0 TO 7
140 FOR i=1 TO N
150 p=ASC(MID$(a$,i,1))
160 adr1=&A400+8*p+j
170 k=PEEK(adr1)
180 b$=BIN$(k,8)
190 FOR k=1 TO 8
200 IF MID$(b$,k,1)="1" THEN PRINT#8,CHR$(p); ELSE PRINT#8," ";
210 NEXT k
220 NEXT i
230 PRINT#8
240 NEXT j
250 RETURN
```

BBC Hints and Tips

by Jonathan Temple

Finding what mode you are in
It is sometimes useful to find out what mode you are in from within a program. A good way to do this is to

define a function:

```
DEFFNmode:A%=135:!&70=USR(&FFF4
) :=?&72
```

Decoding USR call results

Usually USR calls return a 32-bit number representing the 6502 registers P, A, X and Y. This requires complex calculations to discover what values are in the registers you need to know about. If you use a statement like !&70=USR(address) then A will be returned in &70, X in &71, Y in &72 and P in &73.

Listing variables

The key definition below will list the names of all the currently defined variables in memory. If you are using it with a program, you will have to run the program first and only the variables used will be printed. Press f0 to use it.

```
*KEY 0 F.F%=&482TO&F4S.2:A%=
!F%A.&FFFF:IFA%>&FF REP.V.10,13,
—512+F%/2:M%=A%+1:REP.M%=
M%+1:V.?M %:UN.?M%=0: A%=
!A%A.&FFFF:UN.A%<&FF:N.EL.N.|M
```

Polynomial curve fitter

by William Hood

People in business or industry often need to make predictions based on limited information from lab or field reports. Situations from the scientific world come readily to mind: In testing an electroplating setup, let's say you have measured the amount of gold deposited on the surface of a metal in one hour under various voltages. You would like to find a mathematical function that describes the relationship between the independent variable (voltage) and the dependent variable (gold deposited in one hour), so you can predict how much plating will occur for any voltage.

In the area of business, suppose you have corresponding lists of monthly advertising expenditures and sales figures. You want to predict what would happen to the sales if the advertising were doubled.

In both cases, what's needed is a mathematical function $f(x) = y$ that approximates the data, with x the independent variable and y the dependent variable. The function would allow you to extrapolate (predict results outside the measurement range) or interpolate (predict additional results inside the measurement range). Plotting the function produces a smooth curve that shows the underlying trend of the data.

In this article, I'll present a Basic program that finds a polynomial $p(x) = c_1x^n + c_2x^{n-1} + \ldots + c_nx + c_{n+1}$ approximation of the empirical data, letting you try different values for n to obtain the best fit. (The variable n is known as the degree of the polynomial; $c_1, c_2, \ldots$ are the coefficients.)

When the number of data points equals $n+1$, the polynomial's graph will pass exactly through each data point. However, usually the number of data points far exceeds the degree of the polynomial, and the curve is only an approximation that does not hit each point exactly.

This type of curve-fitting is appropriate when the data points are empirical, making them subject to error. Because of the probable errors, it is not important that the graph of $p(x)$ passes exactly through each point. But is is necessary that it be a smooth curve that comes close to the data points. In applications where the curve must pass exactly through the data points, you would be better off using the methods of Bèzier curves or B-splines (Reference: *Free-Form Curves on Your Micro* by Steve Enns, December 1986, Byte). These techniques generate a series of functions connecting the data points.

The program shown here uses the least-squares method to calculate the coefficient c_i of the polynomial. Briefly, this method finds a 'fit' (a set of coefficients) that minimises the sum of squares of the errors. The errors are differences between the predicted values and the experimental values for the dependent variable.

One advantage polynomial approximation has over other methods, such as the Fourier transform, is that you can evaluate polynomials easily by a program or spreadsheet or even by hand, whereas many of the other methods require far more processing.

The method of least-squares usually leads to the construction of a system of linear equations in which the coefficients of the polynomials are the unknowns. But when you use just one polynomial, the resulting system is often ill-conditioned; the solution is very sensitive to round-off error. In such cases, use double-precision arithmetic to overcome the problem. But when you fit the data points by a linear combination of orthogonal polynomials, you avoid the ill-conditioning and end up with a system that you can handle with single-precision arithmetic. The accompanying program uses the orthogonal polynomial method (see reference 1).

Using the program

The program is written in Microsoft Basic and will run on IBM PCs and compatibles. For other computers, you might have to make minor changes.

Whether you read in data from a disk file or type it in, each data point consist of an x and a y value and, optionally, a weight w; $w<1$ gives a data point reduced influence; $w>1$ gives a data point increased significance. You can give more weight to data points that you know are most accurate or to points that lie in a region of special interest. Those heavier-weighted points will have greater influence on fitting the polynomial.

After you enter the data, the program asks you to specify the degree of polynomial you want to try; the degree must be smaller than the number of data points. With this information, the program calculates the coefficients of the polynomial approximation and prints them out in descending order of the exponent of x: coefficient of x^n, coefficient of x^{n-1}, and so forth. The program lets you try other values of n with the same data, and gives a way of gauging which degree results in the best fit.

When n equals the number of data points minus 1, you are assured of a close fit. But this is not usually the case. For large values of n, it is not practical to find a polynomial approximation; the program arbitrarily limits the degree to 10. In practice, the largest degree is typically much smaller then the number of data points and you must try several values of degree n to get the best approximation.

You should try to fit a polynomial using a degree high enough for the polynomial to come close to the true function, yet low enough so that it 'averages out' errors in the data. The program produces a statistic, the residual variance, that you can use to determine which degree gives the best fit. The residual variance is the sum of squares divided by the degrees of freedom (the number of data points minus the number of coefficients).

To find which degree gives the best fit, first fit a polynomial of degree 1 and note the residual variance. Then try degree 2, again noting the variance,-

which should be smaller. Continue with successively higher degrees. The degree that produces the largest decrease in residual variance over its predecessor is the best fit. For example, consider the following data:

x	*y*
0.5	3.0
1.5	7.0
2.5	12.5
5.5	14.5
6.5	16.0
9.5	14.5
10.5	16.0
12.5	16.0
14.5	21.0
15.5	23.0

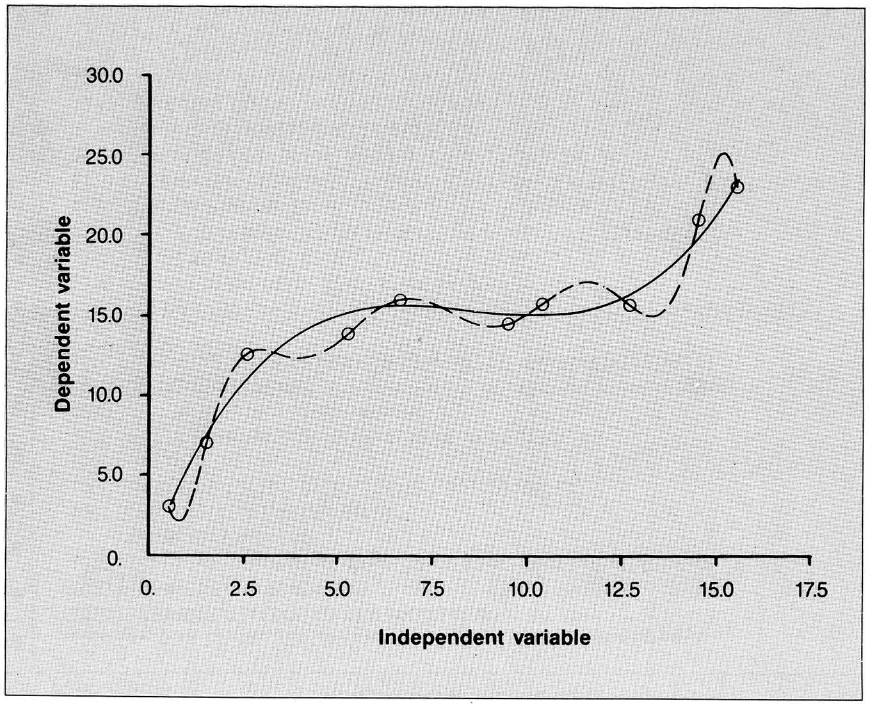


Fig 1 Ten data points approximated by a third-degree polynomial (solid line) and a ninth-degree polynomial (dotted line)

When polynomials of successively higher degree are fit to this data, the program calculates the following residual variances:

Degree	Residual Variance
1	7.20688351
2	7.57981379
3	1.02062389
4	0.99174022

Although there is a decrease in going from the third- to the fourth-degree polynomial, the largest decrease is in going from the second- to the third-degree polynomial. Therefore the third-degree polynomial produces the best fit.

The smoothing effect of the third-degree polynomial is evident when you compare the plot of the third-degree polynomial with that of the ninth-degree polynomial (see Fig 1). As the polynomial degree goes higher, the curve becomes increasingly spiky as it attempts to hit the points even more closely.

The program calculates another statistic, the coefficient of determination, which measures how much of the variation in the values of the dependent variable you can attribute to changes in the independent variable.

For instance, when you fit the above data points with a third-degree polynomial, the coefficient of determination is 0.98. This means that you can attribute 98 per cent of the sum of squares of deviations of the *y* data values from their mean to changes in the *x* data values, and two per cent to random error (assuming that the polynomial is close to the 'true' function, that is, the actual physical relation between the independent and dependent variables of *x* and *y*).

Evaluating the polynomial

If you use the fitted polynomial in another program or spreadsheet model, you should consider the most efficient way to evaluate it; here, the obvious approach is not by any means the best.

Suppose you have the coefficients of an *n*th-degree polynomial in a Basic array *C( )*, where *C(1)* is the coefficient for x^n, *C(2)*, is for x^{n-1},and so forth. The following Basic code evaluates the polynomial in an obvious — but wrong — way:

```
Y=C(N+1)
FOR I=N TO 1 STEP -1
  Y=Y+C(I)*X^(N+1-I)
NEXT I
```

This code will perform $n(n+1)/2$ multiplications or execute the *EXP* or *LOG* routines *n* times, depending on the version of Basic. To quote from an extremely useful resource book on numerical analysis, *Numerical Recipes*, 'come the (computer) revolution, all persons found guilty of such criminal behavior will be summarily executed, and their programs won't be!' (See reference 2.)

A much better approach uses Horner's rule for polynomial evaluation and requires just *n* multiplications:

```
Y=C(1)
FOR I=1 TO N
  Y=X*Y+C(I+1)
NEXT I
```

Suggestions and caveats

You could expand the program to plot the data and the fitted polynomials. However that would make it more machine-specific and considerably longer. A more efficient approach would be to enter the generated polynomial into a general purpose plotting program with all the bells and whistles of scaling, labelling, dotted and dashed lines, and so forth.

Numerical analysis requires you to perform a large number of calculations and to interpret the results intelligently. This program handles the calculation, but the interpretation is still up to you.

END

References

1. For additional information on the least-squares method and orthogonal polynomials see Ralston, A. A First Course in Numerical Analysis, New York: McGraw-Hill, 1965.

2. Press, et al. Numerical Recipes: The Art of Scientific Computation, New York: University Press, 1986.

```
1000 LN=1000: LD=11: REM LN=Max data points; LD=highest degree+1
1010 DEF FNMI(X,Y)=(X<Y)*(-X) + (Y<=X)*(-Y)
1020 N=0: M=0: S2=0: R2=0: MF=0
1030 S1=0: S2=0: S3=0: S4=0: P1=0: P2=0: P3=0: I=0: J=0: J1=0: K=0:
     VR=0 MM=0: WT=0: P=0
1040 DIM X(LN),Y(LN),W(LN),C(LD)
1050 DIM D1(LD),D2(LD),D3(LD),D4(LD),D5(LD),D6(LD)
1060 GOTO 1450
1070 IF MF>0 AND M>MM THEN J1=MM+1: MM=M: GOTO 1130
1080 J1=1: MM=M: S1=0: S2=0: S3=0: S4=0
1090 FOR I=1 TO N: WT=W(I)
1100 S1=S1+WT*X(I): S2=S2+WT: S3=S3+WT*Y(I): S4=S4+WT*Y(I)*Y(I)
1110 NEXT I
1120 D4(1)=S1 / S2: D5(1)=0: D6(1)=S3/S2: D1(1)=0: D2(1)=1: VR=S4-S3*D6(1)
1130 FOR J=J1 TO MM: S1=0: S2=0: S3=0: S4=0
1140 FOR I=1 TO N: P1=0: P2=1
1150 FOR K=1 TO J: P=P2: P2=(X(I)-D4(K))*P2-D5(K)*P1: P1=P: NEXT K
1160 WT=W(I): P=WT*P2*P2
1170 S1=S1+P*X(I): S2=S2+P: S3=S3+WT*P1*P1: S4=S4+WT*Y(I)*P2: NEXT I
1180 D4(J+1)=S1 / S2: D5(J+1)=S2/S3: D6(J+1)=S4/S2:
     D3(1)=-D4(J)*D2(1)-D5(J)*D1(1)
1190 IF J<4 THEN 1210
1200 FOR K=2 TO J-2: D3(K)=D2(K-1)-D4(J)*D2(K)-D5(J) *D1(K): NEXT K
1210 IF J>2 THEN D3(J-1)=D2(J-2)-D4(J)*D2(J-1)-D5(J)
1220 IF J>1 THEN D3(J)=D2(J-1)-D4(J)
1230 FOR K=1 TO J: D1(K)=D2(K): D2(K)=D3(K): D6(K)=D6(K)+D3(K)*D6(J+1): NEXT K
1240 NEXT J
1250 FOR J=1 TO M+1: C(J)=D6(M+2-J): NEXT J
1260 P2=0: FOR I=1 TO N: P=C(1)
1270 FOR J=1 TO M: P=P*X(I)+C(J+1): NEXT J
1280 P=P-Y(I): P2=P2+W(I)*P*P: NEXT I
1290 S2=0: IF N>M+1 THEN S2=P2/(N-M-1)
1300 R2=1: IF VR<>0 THEN R2=1-P2/VR: IF R2<0 THEN R2=0
1310 RETURN
1320 REM GOSUB 30 calls the subroutine
1330 REM Input:
1340 REM N=# of data points
1350 REM X( )=X-coordinates of the data points
1360 REM Y( )=Y-coordinates of the data points
1370 REM W( )=Weighting factors of the data points
1380 REM M=Degree of polynomial
1390 REM MF=0 if new data, MF=1 if old data but higher degree
1400 REM
1410 REM Output:
1420 REM C=Array of M+1 coefficients
1430 REM S2=Residual variance
1440 REM R2=coefficient of determination
1450 CLS
1460 PRINT ''Polyfit. Copyright (C) 1986 by William G. Hood''
1470 PRINT
1480 PRINT ''This program finds the coefficients of the nth degree
polynomial''
1490 PRINT: PRINT ''y = c(1)*x^n + c(2)*x^(n-1) + ... + c(n)*x + c(n+1)
1500 PRINT: PRINT ''that fits a set of data points in a least-squares sense.''
1510 PRINT ''Each data point must consist of an X value, a Y value, and an
1520 PRINT ''optional weight, separated by commas and terminated by a return.
1530 PRINT ''Data is read from a disk file until the eof is reached, or a
1540 PRINT ''specified number of data points are read in from the keyboard.''
1550 PRINT
1560 LINE INPUT ''Name the data file (null line=keyboard): ''; FI$
1570 PRINT ''Is the data weighted (Y / N, null line=No)? '';
1580 W$='''': INPUT W$
1590 IF W$<>''Y'' AND W$<>''y'' THEN W$=''N''
1600 IF FI$<>NU$ THEN 2000
1610 PRINT ''Keyboard data entry''
1620 PRINT ''How many data points ( 2<= n <='';LN;'')'';: INPUT N
1630 IF N<2 OR N>LN THEN 1620
1640 FOR K=1 TO N
1650 IF W$<>''N'' THEN INPUT ''x,y,w'';X(K),Y(K),W(K): W(K)=ABS(W(K))
1660 IF W$=''N'' THEN INPUT ''x,y''; X(K),Y(K): W(K)=1
1670 NEXT K
1680 PM=FNMI(LD-1,N-1)
1690 PRINT ''Degree of polynomial ( 1<= m <= ''; PM;'')'';: INPUT M: M=INT(M)
1700 IF M<1 OR M>PM THEN 1690
1710 GOSUB 1070
1720 PRINT: PRINT ''Coefficients (constant term last): '': K=0
1730 FOR J=1 TO M+1: PRINT TAB(K) C(J);: K=K+20: IF K>20 THEN K=0: PRINT
1740 NEXT J
1750 PRINT: PRINT ''Residual variance: '';S2
1760 R2=INT(1000000!*R2+.5) / 1000000!
1770 PRINT: PRINT''Coefficient of determination: '';R2
1780 PRINT ''Try another degree (Y / N, null line=No)'';: A$='''': INPUT A$
1790 IF A$=''Y'' OR A$=''y'' THEN 1680
1800 PRINT ''Print a table of the data (Y / N, null line=No)'';: A$='''': INPUT
A$
1810 IF A$<>''Y'' AND A$<>''y'' THEN 1870
1820 PRINT: PRINT''Degree of p(x): '';M
1830 PRINT: PRINT '' X''; TAB(11) ''Y''; TAB(25) ''p(x)'': PRINT
1840 FOR I=1 TO N: P=C(1)
1850 FOR K=1 TO M: P=P*X(I)+C(K+1): NEXT K
1860 PRINT X(I);TAB(10);Y(I);TAB(24);P: NEXT I
1870 IF F$<>NU$ THEN END
1880 PRINT: PRINT ''Save the data (Y / N, null line=No)? '';: A$='''': INPUT A$
1890 IF A$<>''Y'' AND A$<>''y'' THEN END
1900 PRINT: LINE INPUT ''Name of output file '';FO$
1910 IF FO$=NU$ THEN END
1920 PRINT ''Writing to '';FO$
1930 OPEN FO$ FOR OUTPUT AS 1
1940 FOR I=1 TO N
1950 IF W$<>''N THEN PRINT#1, X(I);'',''; Y(I);'',''; W(I)
```

```
1960 IF W$=''N'' THEN PRINT#1, X(I);'','';Y(I)
1970 NEXT I
1980 CLOSE 1
1990 END
2000 PRINT ''Reading from '';FI$
2010 OPEN FI$ FOR INPUT AS 1
2020 N=0
2030 PRINT '' X'' TAB(15) ''Y''; TAB(28) ''W''; : PRINT
2040 IF EOF(1) OR N=LN THEN 2100
2050 N=N+1
2060 IF W$<>''N'' THEN INPUT#1, X(N), Y(N), W(N): W(N)=ABS(W(N))
2070 IF W$=''N'' THEN INPUT#1, X(N), Y(N): W(N)=1
2080 PRINT X(N) TAB(14) Y(N) TAB(28) W(N)
2090 GOTO 2040
2100 CLOSE 1
2110 PRINT: PRINT''File contained ''; N;'' data points.''
2120 IF N<2 THEN PRINT ''Too few data points.'': END
2130 GOTO 1680
```

Zip Sort

by Kevin Riordan

MICROTEX 666

This program is available electronically through Microtex 666's software downloading service. It is accessed through Viatel page *6663 #.

In the March 1986 issue of *APC*, we ran a well-received sorting utility for the Commodore 64. Time moves on, and now Kevin Riordan has produced a version for Commodore 128 users. As usual for Kevin's work, full instructions are included in the listing.

```
1000 REM ******************************************************************
1001 REM *                                                                *
1002 REM *                          ZIPSORT128                            *
1003 REM *                                                                *
1004 REM *     A FAST COMMODORE 128 MACHINE CODE SORT FOR UP TO FOUR      *
1005 REM *          ONE-DIMENSIONAL ARRAYS OF ANY TYPE IN TANDEM          *
1006 REM *                                                                *
1007 REM *                                                                *
1008 REM *                                                                *
1009 REM *                    (KEVIN RIORDAN 1987)                        *
1010 REM *                                                                *
1011 REM ******************************************************************
1012 :
1013 REM  THIS PROGRAM CREATES A MACHINE-CODE FILE ON DRIVE 0 CALLED '-ZIPSORT'
1014 REM    WHICH YOU MAY LOAD AND CALL FROM A BASIC PROGRAM IN ORDER TO SORT
1015 REM    UP TO FOUR ARRAYS IN TANDEM.  THE ARRAYS MAY BE OF ANY TYPE (REAL,
1016 REM    INTEGER OR STRING), BUT THEY MUST BE ONE-DIMENSIONAL AND HAVE THE
1017 REM    SAME NUMBER OF ELEMENTS.  THE MACHINE-CODE ROUTINE MAKES NO EFFORT
1018 REM    TO CHECK THAT THESE CONDITIONS HAVE BEEN MET, AND THE BURDEN IS ON
1019 REM    YOU TO ENSURE THAT THEY ARE OBSERVED.
1020 :
1021 REM  THE ROUTINE IS INVOKED FROM YOUR BASIC PROGRAM WITH THE FOLLOWING
1022 REM    SEQUENCE OF COMMANDS:
1023 :
1024 REM             BANK 15:SYS 4864:BANK 0
1025 :
1026 REM  HOWEVER, BEFORE YOU ISSUE THE SORT COMMAND IN THAT FORM, THERE IS A
1027 REM    CERTAIN AMOUNT OF INITIALISATION WHICH YOU MUST PERFORM SO THAT
1028 REM    THE SORT ROUTINE HAS THE PARAMETERS WHICH IT REQUIRES.
1029 :
1030 REM  THIS ENTAILS SETTING UP A LIST OF THE NAMES OF THE ARRAYS YOU WANT
1031 REM    TO SORT IN TANDEM, TOGETHER WITH THEIR ZERO-ELEMENT ADDRESSES.
1032 REM    EACH ARRAY IS ASSIGNED A 4-BYTE SEGMENT IN THE 16-BYTE DATA BLOCK
1033 REM    COMMENCING AT DECIMAL LOCATION 5760 IN BANK 0.
1034 :
1035 REM  THERE ARE SOME IMPORTANT RULES REGARDING THE WAY IN WHICH BASIC
```

```
1036 REM    STORES VARIABLE NAMES, WHICH YOU MUST TAKE INTO ACCOUNT IF YOU
1037 REM    ARE TO USE THE SORT ROUTINE SUCCESSFULLY.  ONLY THE FIRST TWO
1038 REM    CHARACTERS OF ANY VARIABLE OR ARRAY NAME ARE SIGNIFICANT, AND THEY
1039 REM    ARE STORED IN DIFFERENT FORMATS DEPENDING ON THE TYPE OF VARIABLE
1040 REM    OR ARRAY THEY DESCRIBE.
1041 :
1042 REM  IN THE CASE OF A REAL (FLOATING POINT) VARIABLE, THE NORMAL ASCII
1043 REM    VALUES OF THE FIRST TWO CHARACTERS OF ITS NAME ARE DESCRIBED, E.G.
1044 REM    THE VARIABLE AA WILL BE DESCRIBED BY THE DECIMAL VALUES 65-65.
1045 :
1046 REM  A STRING VARIABLE IS DESCRIBED BY THE NORMAL ASCII VALUE OF ITS
1047 REM    NAME INITIAL AND THE NEGATIVE ASCII VALUE OF ITS SECOND CHARACTER.
1048 REM    THE VARIABLE AA$, THEREFORE, IS DESCRIBED BY THE DECIMAL VALUES
1049 REM    65-193.  NOTE THAT 193 IS 65 WITH 128 ADDED TO IT TO MAKE IT A
1050 REM    NEGATIVE VALUE.
1051 :
1052 REM  BOTH CHARACTERS OF THE NAME OF AN INTEGER VARIABLE ARE NEGATIVE, SO
1053 REM    THAT THE VARIABLE AA% WILL BE DESCRIBED BY THE DECIMAL VALUES 193-
1054 REM    193.
1055 :
1056 REM  TO SET UP THE ARRAY LIST FOR SORTING, YOU SIMPLY POKE THE DECIMAL
1057 REM    VALUES OF THE NAME OF EACH ARRAY INTO THE FIRST TWO BYTES OF THE
1058 REM    4-BYTE BLOCK ASSIGNED TO IT IN THE 16-BYTE LIST SPACE AT 5760.
1059 :
1060 REM  YOU THEN POKE THE LOW-BYTE, HIGH-BYTE VALUES OF EACH ARRAY'S ZERO-
1061 REM    ELEMENT ADDRESS INTO THE THIRD AND FOURTH BYTES OF THE 4-BYTE
1062 REM    BLOCK ASSIGNED TO IT.
1063 :
1064 REM  THE NEXT STEP IS TO POKE LOCATION 5776 WITH THE NUMBER OF ARRAYS
1065 REM    YOU HAVE INCLUDED IN YOUR LIST FOR SORTING.  THIS MUST, OBVIOUSLY,
1066 REM    BE A VALUE BETWEEN 1 AND 4 INCLUSIVE.
1067 :
1068 REM  LOCATIONS 5777 AND 5778 ARE THEN POKED WITH THE LOW-BYTE, HIGH-BYTE
1069 REM    REPRESENTATION OF THE NUMBER OF ELEMENTS THE ARRAYS CONTAIN.
1070 :
1071 REM  FINALLY, YOU DETERMINE THE DIRECTION OF THE SORT (ASCENDING OR
1072 REM    DESCENDING ORDER) AND WHETHER OR NOT THE SORT IS TO INCLUDE THE
1073 REM    ZERO ELEMENT OF EACH ARRAY BY POKING LOCATION 5779 WITH AN
1074 REM    APPROPRIATE VALUE:
1075 :
1076 REM          0 = ASCENDING  SORT INCLUDING ZERO ELEMENT
1077 REM         64 = ASCENDING  SORT EXCLUDING ZERO ELEMENT
1078 REM        128 = DESCENDING SORT INCLUDING ZERO ELEMENT
1079 REM        192 = DESCENDING SORT EXCLUDING ZERO ELEMENT
1080 :
1081 REM  AS A PRACTICAL EXAMPLE, SUPPOSE YOU HAVE THREE ARRAYS WHICH YOU
1082 REM    HAVE USED TO DO A PAYROLL CALCULATION AND YOU NOW WANT TO SORT
1083 REM    THEM INTO ASCENDING ALPHABETIC ORDER ON 1,000 EMPLOYEES' NAMES.
1084 :
1085 REM  THE ARRAYS ARE:
1086 :
1087 REM        NAME$          EMPLOYEES' NAMES
1088 REM        HOURS%         HOURS WORKED
1089 REM        GROSS          GROSS PAY
1090 :
1091 REM  THE FOLLOWING CODING WILL ACCOMPLISH THE REQUIRED TASK:
1092 :
1093 REM  *************** SET UP KEY ARRAY (STRING)
1094 REM        POKE 5760, ASC("N")
1095 REM        POKE 5761, ASC("A")+128
1096 REM        P=POINTER(NAME$(0))
1097 REM        POKE 5762, 255 AND P
1098 REM        POKE 5763, P/256
1099 REM  *************** SET UP SECOND ARRAY (INTEGER)
1100 REM        POKE 5764, ASC("H")+128
1101 REM        POKE 5765, ASC("O")+128
1102 REM        P=POINTER(HOURS%(0))
1103 REM        POKE 5766, 255 AND P
1104 REM        POKE 5767, P/256
1105 REM  *************** SET UP THIRD ARRAY (REAL)
1106 REM        POKE 5768, ASC("G")
1107 REM        POKE 5769, ASC("R")
1108 REM        P=POINTER(GROSS(0))
1109 REM        POKE 5770, 255 AND P
1110 REM        POKE 5771, P/256
1111 REM  *************** HOW MANY ARRAYS IN OUR LIST?  THREE.
1112 REM        POKE 5776, 3
1113 REM  *************** HOW MANY ELEMENTS IN EACH ARRAY?  1000.
1114 REM        POKE 5777, 255 AND 1000
1115 REM        POKE 5778, 1000/256
1116 REM  *************** ASCENDING DIRECTION, ZERO ELEMENT EXCLUDED
1117 REM        POKE 5779, 64
1118 REM  *************** PERFORM THE SORT
1119 REM        BANK 15
1120 REM        SYS 4864
1121 REM        BANK 0
1122 :
1123 REM  ONLY THE DATA ITEMS FROM LINE 1138 NEED BE ENTERED; I HAVE INCLUDED
1124 REM    THE FULL ASSEMBLY DOCUMENTATION TO ENABLE YOU TO FOLLOW THE LOGIC
1125 REM    OF THE ROUTINE IF YOU WISH TO DO SO.
1126 :
1127 REM  CODE TO CREATE THE MACHINE-CODE FILE STARTS HERE:
1128 :
1129 OPEN2,8,2,"0:-ZIPSORT,P,W"
1130 PRINT#2,CHR$(0);CHR$(19);
1131 FOR X=4864 TO 5788
1132 :  READ HX$
1133 :  PRINT#2, CHR$(INPUT(HX$));
1134 NEXT
1135 CLOSE2
1136 END
1137 :
1138 REM  SYSTEM EQUATES
1139 REM  BANK   = $02
1140 REM  PCHI   = $03
1141 REM  PCLO   = $04
1142 REM  SREG   = $05
1143 REM  AREG   = $06
1144 REM  XREG   = $07
1145 REM  YREG   = $08
1146 REM  LINNUM = $16
1147 REM  INDEX  = $24
1148 REM  INDEX2 = $26
1149 REM  VARNAM = $47
1150 REM  VARPTR = $49
1151 REM  TEMP1  = $50
1152 REM  TEMP1A = $51
1153 REM  TEMP2  = $53
1154 REM  TEMP2A = $54
1155 REM  HIGHDS = $5A
1156 REM  FACEXP = $63
1157 REM  FACHO  = $64
1158 REM  FACMOH = $65
1159 REM  FACMO  = $66
1160 REM  FACLO  = $67
1161 REM  FACSGN = $68
1162 REM  FACOV  = $71
1163 REM  FBUFPT = $72
1164 REM  STORE  = $FA
1165 REM  EXPTR  = $FB
1166 REM  PTR    = $FD
1167 REM  STAVEC = $02B9
1168 REM  CMPVEC = $02C8
1169 REM  JSRFAR = $02CD
1170 REM  FDLMNT = $7E1C
1171 REM  INDFET = $FF74
1172 REM  INDSTA = $FF77
1173 REM  INDCMP = $FF7A
1174 :
1175 REM        * = $1300
1176 :
1177 DATA AD,91,16    :REM    SORT   LDA TOTAL      ;GAP=TOTAL # OF ELEMENTS
1178 DATA 8D,9B,16    :REM           STA GAP        ;  TO BE SORTED
1179 DATA AD,92,16    :REM           LDA TOTAL+1
1180 DATA 8D,9C,16    :REM           STA GAP+1
1181 DATA A9,80       :REM           LDA #<ARYLST   ;PTR -> START OF OUR
1182 DATA 85,FD       :REM           STA PTR        ;  ARRAY LIST
1183 DATA A9,16       :REM           LDA #>ARYLST
1184 DATA 85,FE       :REM           STA PTR+1
1185 DATA AE,90,16    :REM           LDX ARRAYS     ;PTR -> END OF OUR
1186 DATA 18          :REM    SORT1  CLC            ;  ARRAY LIST
1187 DATA A5,FD       :REM           LDA PTR
1188 DATA 69,04       :REM           ADC #4
1189 DATA 85,FD       :REM           STA PTR
1190 DATA A5,FE       :REM           LDA PTR+1
1191 DATA 69,00       :REM           ADC #0
1192 DATA 85,FE       :REM           STA PTR+1
1193 DATA CA          :REM           DEX
1194 DATA D0,F0       :REM           BNE SORT1
1195 DATA AD,9B,16    :REM    SORT2  LDA GAP        ;IF GAP<2 THEN SORT
1196 DATA C9,02       :REM           CMP #2         ;  IS COMPLETE
1197 DATA AD,9C,16    :REM           LDA GAP+1
1198 DATA E9,00       :REM           SBC #0
1199 DATA B0,01       :REM           BCS SORT3
1200 DATA 60          :REM           RTS
1201 DATA 4E,9C,16    :REM    SORT3  LSR GAP+1      ;HALVE GAP
1202 DATA 6E,9B,16    :REM           ROR GAP
1203 DATA 38          :REM           SEC            ;LIMIT=TOTAL-GAP
1204 DATA AD,91,16    :REM           LDA TOTAL
1205 DATA ED,9B,16    :REM           SBC GAP
1206 DATA 8D,95,16    :REM           STA LIMIT
1207 DATA AD,92,16    :REM           LDA TOTAL+1
1208 DATA ED,9C,16    :REM           SBC GAP+1
1209 DATA 8D,96,16    :REM           STA LIMIT+1
```

```
1210 DATA A9,00        :REM   SORT4  LDA #0          ;SET SWAP FLAG=0
1211 DATA 8D,94,16     :REM          STA SWPFLG
1212 DATA A2,FF        :REM          LDX #255
1213 DATA 2C,93,16     :REM          BIT FLAG        ;SORT FROM ELEMENT 0?
1214 DATA 50,01        :REM          BVC SORT5       ;YES
1215 DATA E8           :REM          INX             ;NO
1216 DATA 8E,99,16     :REM   SORT5  STX LOWER       ;LOWER=START ELEMENT-1
1217 DATA 8E,9A,16     :REM          STX LOWER+1
1218 DATA EE,99,16     :REM   SORT6  INC LOWER       ;NEXT LOWER ELEMENT
1219 DATA D0,03        :REM          BNE SORT7
1220 DATA EE,9A,16     :REM          INC LOWER+1
1221 DATA AD,95,16     :REM   SORT7  LDA LIMIT       ;LIMIT < LOWER?
1222 DATA CD,99,16     :REM          CMP LOWER       ;IF NOT, STILL SAME PASS,
1223 DATA AD,96,16     :REM          LDA LIMIT+1     ;  ELSE PASS COMPLETE
1224 DATA ED,9A,16     :REM          SBC LOWER+1
1225 DATA B0,07        :REM          BCS SORT8
1226 DATA AD,94,16     :REM          LDA SWPFLG      ;SWAP DURING PASS?
1227 DATA D0,D2        :REM          BNE SORT4       ;NO, NEXT PASS
1228 DATA F0,AA        :REM          BEQ SORT2       ;YES, PASS AGAIN
1229 DATA A2,03        :REM   SORT8  LDX #3          ;COPY KEY ARRAY DETAILS
1230 DATA BD,80,16     :REM   SORT9  LDA ARYLST,X    ;  TO VARNAM, VARPTR
1231 DATA 95,47        :REM          STA VARNAM,X
1232 DATA CA           :REM          DEX
1233 DATA 10,FB        :REM          BPL SORT9
1234 DATA A5,49        :REM          LDA VARPTR      ;COPY ELEMENT 0 ADDRESS
1235 DATA 85,5A        :REM          STA HIGHDS      ;  TO HIGHDS
1236 DATA A5,4A        :REM          LDA VARPTR+1
1237 DATA 85,5B        :REM          STA HIGHDS+1
1238 DATA AD,99,16     :REM          LDA LOWER       ;PASS # OF LOWER ELEMENT
1239 DATA 85,72        :REM          STA FBUFPT      ;  TO FBUFPT SO THAT WE
1240 DATA AD,9A,16     :REM          LDA LOWER+1     ;  CAN LOCATE IT IN BANK 1
1241 DATA 85,73        :REM          STA FBUFPT+1    ;  MEMORY
1242 DATA 20,D0,15     :REM          JSR FIND        ;FIND LOWER ELEMENT AND
1243 DATA A5,49        :REM          LDA VARPTR      ;  COPY ITS ADDRESS TO
1244 DATA A4,4A        :REM          LDY VARPTR+1    ;  EXPTR
1245 DATA 85,FB        :REM          STA EXPTR
1246 DATA 84,FC        :REM          STY EXPTR+1
1247 DATA 18           :REM          CLC             ;ESTABLISH # OF UPPER
1248 DATA AD,99,16     :REM          LDA LOWER       ;  ELEMENT (= LOWER+GAP)
1249 DATA 6D,9B,16     :REM          ADC GAP
1250 DATA 8D,97,16     :REM          STA UPPER
1251 DATA AD,9A,16     :REM          LDA LOWER+1
1252 DATA 6D,9C,16     :REM          ADC GAP+1
1253 DATA 8D,98,16     :REM          STA UPPER+1
1254 DATA A2,03        :REM          LDX #3          ;COPY KEY ARRAY DETAILS
1255 DATA BD,80,16     :REM   SORT10 LDA ARYLST,X    ;  TO VARNAM, VARPTR
1256 DATA 95,47        :REM          STA VARNAM,X    ;  (THEY'VE BEEN BASHED
1257 DATA CA           :REM          DEX             ;   SINCE SORT9!)
1258 DATA 10,F8        :REM          BPL SORT10
1259 DATA A5,49        :REM          LDA VARPTR      ;COPY ELEMENT 0 ADDRESS
1260 DATA 85,5A        :REM          STA HIGHDS      ;  TO HIGHDS
1261 DATA A5,4A        :REM          LDA VARPTR+1
1262 DATA 85,5B        :REM          STA HIGHDS+1
1263 DATA AD,97,16     :REM          LDA UPPER       ;FIND UPPER ELEMENT IN
1264 DATA 85,72        :REM          STA FBUFPT      ;  BANK 1, JUST AS WE
1265 DATA AD,98,16     :REM          LDA UPPER+1     ;  FOUND LOWER ELEMENT
1266 DATA 85,73        :REM          STA FBUFPT+1
1267 DATA 20,D0,15     :REM          JSR FIND
1268 DATA 2C,93,16     :REM          BIT FLAG        ;SORT DIRECTION?
1269 DATA 10,03        :REM          BPL SORT11      ;ASCENDING
1270 DATA 4C,60,14     :REM          JMP SORT17      ;DESCENDING
1271 :
1272 :                  REM  HANDLE ASCENDING SORT
1273 :
1274 DATA 24,47        :REM   SORT11 BIT VARNAM      ;KEY ARRAY TYPE?
1275 DATA 30,1C        :REM          BMI SORT12      ;MUST BE INTEGER!
1276 DATA 24,48        :REM          BIT VARNAM+1    ;TEST FOR REAL OR STRING
1277 DATA 30,3F        :REM          BMI SORT14      ;MUST BE STRING!
1278 DATA A5,FB        :REM          LDA EXPTR       ;MOVE LOWER ELEMENT TO
1279 DATA A4,FC        :REM          LDY EXPTR+1     ;  FLOATING POINT
1280 DATA 20,E3,15     :REM          JSR MOVE        ;  ACCUMULATOR
1281 DATA A5,49        :REM          LDA VARPTR      ;COMPARE UPPER ELEMENT
1282 DATA A4,4A        :REM          LDY VARPTR+1    ;  TO LOWER, SWAPPING
1283 DATA 20,19,16     :REM          JSR COMP        ;  ONLY IF LESS
1284 DATA F0,02        :REM          BEQ NOSWAP
1285 DATA 10,03        :REM          BPL GOSWAP
1286 DATA 4C,60,13     :REM   NOSWAP JMP SORT6
1287 DATA 4C,E4,14     :REM   GOSWAP JMP SWAP
1288 DATA A0,01        :REM   SORT12 LDY #1
1289 DATA 84,08        :REM   SORT13 STY YREG        ;FETCH UPPER ELEMENT
1290 DATA A9,49        :REM          LDA #<VARPTR    ;  INTEGER DESCRIPTOR TO
1291 DATA 85,06        :REM          STA AREG        ;  TEMP1 STORAGE AREA
1292 DATA 20,8B,15     :REM          JSR FETCH
1293 DATA 99,50,00     :REM          STA TEMP1,Y
1294 DATA A9,FB        :REM          LDA #<EXPTR     ;FETCH LOWER ELEMENT
1295 DATA 85,06        :REM          STA AREG        ;  INTEGER DESCRIPTOR TO
1296 DATA 20,8B,15     :REM          JSR FETCH       ;  TEMP2 STORAGE AREA
1297 DATA 99,53,00     :REM          STA TEMP2,Y
1298 DATA 88           :REM          DEY
1299 DATA 10,E7        :REM          BPL SORT13
1300 DATA A5,50        :REM          LDA TEMP1       ;SWAP ONLY IF UPPER
1301 DATA C5,53        :REM          CMP TEMP2       ;  ELEMENT LESS THAN
1302 DATA A5,51        :REM          LDA TEMP1+1     ;  LOWER ELEMENT
1303 DATA E5,54        :REM          SBC TEMP2+1
1304 DATA B0,D5        :REM          BCS NOSWAP
1305 DATA 90,D6        :REM          BCC GOSWAP
1306 DATA A0,02        :REM   SORT14 LDY #2          ;FETCH LOWER ELEMENT
1307 DATA 84,08        :REM   SORT15 STY YREG        ;  STRING DESCRIPTOR TO
1308 DATA A9,FB        :REM          LDA #<EXPTR     ;  TEMP1 STORAGE AREA
1309 DATA 85,06        :REM          STA AREG
1310 DATA 20,8B,15     :REM          JSR FETCH
1311 DATA 99,50,00     :REM          STA TEMP1,Y
1312 DATA A9,49        :REM          LDA #<VARPTR    ;FETCH UPPER ELEMENT
1313 DATA 85,06        :REM          STA AREG        ;  STRING DESCRIPTOR TO
1314 DATA 20,8B,15     :REM          JSR FETCH       ;  TEMP2 STORAGE AREA
1315 DATA 99,53,00     :REM          STA TEMP2,Y
1316 DATA 88           :REM          DEY
1317 DATA 10,E7        :REM          BPL SORT15
1318 DATA C8           :REM   SORT16 INY             ;EXIT TO NOSWAP IF LOWER
1319 DATA C4,50        :REM          CPY TEMP1       ;  STRING LENGTH MET, TO
1320 DATA B0,B3        :REM          BCS NOSWAP      ;  SWAP IF UPPER STRING
1321 DATA C4,53        :REM          CPY TEMP2       ;  LENGTH MET
1322 DATA B0,B2        :REM          BCS GOSWAP
1323 DATA A9,51        :REM          LDA #<TEMP1A    ;FETCH NEXT BYTE OF LOWER
1324 DATA 85,06        :REM          STA AREG        ;  ELEMENT STRING
1325 DATA 84,08        :REM          STY YREG
1326 DATA 20,8B,15     :REM          JSR FETCH
1327 DATA A9,54        :REM          LDA #<TEMP2A    ;COMPARE IT WITH NEXT BYTE
1328 DATA 8D,C8,02     :REM          STA CMPVEC      ;  OF UPPER ELEMENT STRING
1329 DATA 20,B6,15     :REM          JSR MATCH
1330 DATA 90,9C        :REM          BCC NOSWAP      ;NO SWAP IF LESS
1331 DATA F0,E2        :REM          BEQ SORT16      ;KEEP SCANNING IF EQUAL
1332 DATA B0,9B        :REM          BCS GOSWAP      ;SWAP IF GREATER
1333 :
1334 :                  REM  HANDLE DESCENDING SORT
1335 :
1336 DATA 24,47        :REM   SORT17 BIT VARNAM      ;KEY ARRAY TYPE?
1337 DATA 30,1C        :REM          BMI SORT19      ;AND SO ON......
1338 DATA 24,48        :REM          BIT VARNAM+1
1339 DATA 30,40        :REM          BMI SORT21
1340 DATA A5,49        :REM          LDA VARPTR
1341 DATA A4,4A        :REM          LDY VARPTR+1
1342 DATA 20,E3,15     :REM          JSR MOVE
1343 DATA A5,FB        :REM          LDA EXPTR
1344 DATA A4,FC        :REM          LDY EXPTR+1
1345 DATA 20,19,16     :REM          JSR COMP
1346 DATA F0,05        :REM          BEQ SORT18
1347 DATA 30,03        :REM          BMI SORT18
1348 DATA 4C,E4,14     :REM          JMP SWAP
1349 DATA 4C,60,13     :REM   SORT18 JMP SORT6
1350 DATA A0,01        :REM   SORT19 LDY #1
1351 DATA 84,08        :REM   SORT20 STY YREG
1352 DATA A9,FB        :REM          LDA #<EXPTR
1353 DATA 85,06        :REM          STA AREG
1354 DATA 20,8B,15     :REM          JSR FETCH
1355 DATA 99,50,00     :REM          STA TEMP1,Y
1356 DATA A9,49        :REM          LDA #<VARPTR
1357 DATA 85,06        :REM          STA AREG
1358 DATA 20,8B,15     :REM          JSR FETCH
1359 DATA 99,53,00     :REM          STA TEMP2,Y
1360 DATA 88           :REM          DEY
1361 DATA 10,E7        :REM          BPL SORT20
1362 DATA A5,50        :REM          LDA TEMP1
1363 DATA C5,53        :REM          CMP TEMP2
1364 DATA A5,51        :REM          LDA TEMP1+1
1365 DATA E5,54        :REM          SBC TEMP2+1
1366 DATA B0,D8        :REM          BCS SORT18
1367 DATA 4C,E4,14     :REM          JMP SWAP
1368 DATA A0,02        :REM   SORT21 LDY #2
1369 DATA 84,08        :REM   SORT22 STY YREG
1370 DATA A9,FB        :REM          LDA #<EXPTR
1371 DATA 85,06        :REM          STA AREG
1372 DATA 20,8B,15     :REM          JSR FETCH
1373 DATA 99,50,00     :REM          STA TEMP1,Y
1374 DATA A9,49        :REM          LDA #<VARPTR
1375 DATA 85,06        :REM          STA AREG
1376 DATA 20,8B,15     :REM          JSR FETCH
1377 DATA 99,53,00     :REM          STA TEMP2,Y
1378 DATA 88           :REM          DEY
1379 DATA 10,E7        :REM          BPL SORT22
1380 DATA C8           :REM   SORT23 INY
1381 DATA C4,50        :REM          CPY TEMP1
1382 DATA B0,1C        :REM          BCS SWAP
1383 DATA C4,53        :REM          CPY TEMP2
```

```
1384 DATA B0,15        :REM          BCS SORT24
1385 DATA A9,54        :REM          LDA #<TEMP2A
1386 DATA 85,06        :REM          STA AREG
1387 DATA 84,08        :REM          STY YREG
1388 DATA 20,8B,15     :REM          JSR FETCH
1389 DATA A9,51        :REM          LDA #<TEMP1A
1390 DATA 8D,C8,02     :REM          STA CMPVEC
1391 DATA 20,B6,15     :REM          JSR MATCH
1392 DATA F0,E4        :REM          BEQ SORT23
1393 DATA B0,03        :REM          BCS SWAP
1394 DATA 4C,60,13     :REM   SORT24 JMP SORT6
1395 DATA A9,01        :REM   SWAP   LDA #1            ;INDICATE SWAP MADE DURING
1396 DATA 8D,94,16     :REM          STA SWPFLG        ;  CURRENT PASS
1397 DATA A9,80        :REM          LDA #<ARYLST      ;LINNUM -> OUR ARRAY LIST
1398 DATA 85,16        :REM          STA LINNUM
1399 DATA A9,16        :REM          LDA #>ARYLST
1400 DATA 85,17        :REM          STA LINNUM+1
1401 DATA A0,03        :REM   SWAP2  LDY #3            ;COPY NEXT ARRAY'S DETAILS
1402 DATA B1,16        :REM   SWAP3  LDA (LINNUM),Y    ;  TO VARNAM, VARPTR
1403 DATA 99,47,00     :REM          STA VARNAM,Y
1404 DATA 88           :REM          DEY
1405 DATA 10,F8        :REM          BPL SWAP3
1406 DATA A5,49        :REM          LDA VARPTR        ;COPY ZERO ELEMENT ADDRESS
1407 DATA 85,5A        :REM          STA HIGHDS        ;  TO HIGHDS
1408 DATA A5,4A        :REM          LDA VARPTR+1
1409 DATA 85,5B        :REM          STA HIGHDS+1
1410 DATA AD,99,16     :REM          LDA LOWER         ;PASS # OF LOWER ELEMENT
1411 DATA 85,72        :REM          STA FBUFPT        ;  TO FBUFPT
1412 DATA AD,9A,16     :REM          LDA LOWER+1
1413 DATA 85,73        :REM          STA FBUFPT+1
1414 DATA 20,D0,15     :REM          JSR FIND          ;FIND LOWER ELEMENT
1415 DATA A5,49        :REM          LDA VARPTR        ;INDEX -> LOWER ELEMENT
1416 DATA 85,24        :REM          STA INDEX
1417 DATA A5,4A        :REM          LDA VARPTR+1
1418 DATA 85,25        :REM          STA INDEX+1
1419 DATA A0,03        :REM          LDY #3            ;COPY THIS ARRAY'S DETAILS
1420 DATA B1,16        :REM   SWAP4  LDA (LINNUM),Y    ;  TO VARNAM, VARPTR (WHICH
1421 DATA 99,47,00     :REM          STA VARNAM,Y      ;  HAVE BEEN CLOBBERED BY
1422 DATA 88           :REM          DEY               ;  PREVIOUS FIND)
1423 DATA 10,F8        :REM          BPL SWAP4
1424 DATA A5,49        :REM          LDA VARPTR        ;COPY ZERO ELEMENT ADDRESS
1425 DATA 85,5A        :REM          STA HIGHDS        ;  TO HIGHDS
1426 DATA A5,4A        :REM          LDA VARPTR+1
1427 DATA 85,5B        :REM          STA HIGHDS+1
1428 DATA AD,97,16     :REM          LDA UPPER         ;PASS # OF UPPER ELEMENT
1429 DATA 85,72        :REM          STA FBUFPT        ;  TO FBUFPT
1430 DATA AD,98,16     :REM          LDA UPPER+1
1431 DATA 85,73        :REM          STA FBUFPT+1
1432 DATA 20,D0,15     :REM          JSR FIND          ;FIND UPPER ELEMENT
1433 DATA 24,47        :REM          BIT VARNAM        ;ARRAY TYPE?
1434 DATA 30,07        :REM          BMI SWAP5         ;INTEGER
1435 DATA 24,48        :REM          BIT VARNAM+1
1436 DATA 30,06        :REM          BMI SWAP6         ;STRING
1437 DATA A0,04        :REM          LDY #4            ;LENGTH OF FP ELEMENT
1438 DATA 2C           :REM          .BYT $2C          ;DUMMY BIT TO PASS OVER
1439 DATA A0,01        :REM   SWAP5  LDY #1            ;LENGTH OF INTEGER LMNT
1440 DATA 2C           :REM          .BYT $2C          ;DUMMY BIT TO PASS OVER
1441 DATA A0,02        :REM   SWAP6  LDY #2            ;STRING DESCRIPTOR LENGTH
1442 DATA 84,08        :REM   SWAP7  STY YREG
1443 DATA A9,24        :REM          LDA #<INDEX       ;FETCH BYTE <- INDEX
1444 DATA 85,06        :REM          STA AREG
1445 DATA 20,8B,15     :REM          JSR FETCH
1446 DATA 85,FA        :REM          STA STORE
1447 DATA A9,49        :REM          LDA #<VARPTR      ;FETCH BYTE <- VARPTR
1448 DATA 85,06        :REM          STA AREG
1449 DATA 20,8B,15     :REM          JSR FETCH
1450 DATA A9,24        :REM          LDA #<INDEX       ;PASS BYTE TO BANK 1 LOCN
1451 DATA 8D,B9,02     :REM          STA STAVEC        ;  ADDRESSED BY INDEX
1452 DATA 20,A3,15     :REM          JSR STASH
1453 DATA A9,49        :REM          LDA #<VARPTR      ;PASS OTHER BYTE TO BANK 1
1454 DATA 8D,B9,02     :REM          STA STAVEC        ;  LOCN ADDRESSED BY
1455 DATA A5,FA        :REM          LDA STORE         ;  VARPTR
1456 DATA 85,06        :REM          STA AREG
1457 DATA 20,A3,15     :REM          JSR STASH
1458 DATA A4,08        :REM          LDY YREG
1459 DATA 88           :REM          DEY               ;SWAP NEXT BYTES
1460 DATA 10,D5        :REM          BPL SWAP7
1461 DATA 18           :REM          CLC               ;LINNUM -> NEXT 4-BYTE
1462 DATA A5,16        :REM          LDA LINNUM        ;  BLOCK IN ARRAY LIST
1463 DATA 69,04        :REM          ADC #4
1464 DATA 90,02        :REM          BCC SWAP8
1465 DATA E6,17        :REM          INC LINNUM+1
1466 DATA 85,16        :REM   SWAP8  STA LINNUM        ;TEST FOR END OF LIST
1467 DATA C5,FD        :REM          CMP PTR
1468 DATA A5,17        :REM          LDA LINNUM+1
1469 DATA E5,FE        :REM          SBC PTR+1
1470 DATA B0,03        :REM          BCS SWAP9
1471 DATA 4C,F1,14     :REM          JMP SWAP2         ;NEXT ARRAY IN LIST
1472 DATA 4C,60,13     :REM   SWAP9  JMP SORT6         ;NEXT SORT PASS
1473 :
1474 :                  REM   SUBROUTINE TO FETCH DATA FROM BANK 1 LOCATION
1475 :                  REM   ADDRESSED BY INDIRECTION IN AREG.  EXITS WITH
1476 :                  REM   DATA BYTE IN A AND Y REGISTER RECOVERED.
1477 :
1478 DATA A9,0F        :REM   FETCH  LDA #15           ;CALLING INDFET IN BANK
1479 DATA 85,02        :REM          STA BANK          ;  15
1480 DATA A9,FF        :REM          LDA #>INDFET
1481 DATA 85,03        :REM          STA PCHI
1482 DATA A9,74        :REM          LDA #<INDFET
1483 DATA 85,04        :REM          STA PCLO
1484 DATA A9,01        :REM          LDA #1            ;DATA TO COME FROM BANK
1485 DATA 85,07        :REM          STA XREG          ;  1
1486 DATA 20,CD,02     :REM          JSR JSRFAR        ;FETCH THE DATA
1487 DATA A4,08        :REM          LDY YREG          ;RECOVER Y REGISTER AND
1488 DATA A5,06        :REM          LDA AREG          ;  DATA BYTE IN A
1489 DATA 60           :REM          RTS
1490 :
1491 :                  REM   SUBROUTINE TO STASH DATA IN BANK 1 LOCATION
1492 :                  REM   ADDRESSED BY INDIRECTION IN STAVEC.
1493 :
1494 DATA A9,0F        :REM   STASH  LDA #15           ;CALLING INDSTA IN BANK
1495 DATA 85,02        :REM          STA BANK          ;  15
1496 DATA A9,FF        :REM          LDA #>INDSTA
1497 DATA 85,03        :REM          STA PCHI
1498 DATA A9,77        :REM          LDA #<INDSTA
1499 DATA 85,04        :REM          STA PCLO
1500 DATA A9,01        :REM          LDA #1            ;DATA TO GO TO BANK 1
1501 DATA 85,07        :REM          STA XREG
1502 DATA 4C,CD,02     :REM          JMP JSRFAR
1503 :
1504 :                  REM   SUBROUTINE TO COMPARE DATA IN AREG WITH DATA
1505 :                  REM   IN BANK 1 LOCATION ADDRESSED BY INDIRECTION
1506 :                  REM   IN CMPVEC
1507 :
1508 DATA A9,0F        :REM   MATCH  LDA #15           ;CALLING INDCMP IN BANK
1509 DATA 85,02        :REM          STA BANK          ;  15
1510 DATA A9,FF        :REM          LDA #>INDCMP
1511 DATA 85,03        :REM          STA PCHI
1512 DATA A9,7A        :REM          LDA #<INDCMP
1513 DATA 85,04        :REM          STA PCLO
1514 DATA A9,01        :REM          LDA #1
1515 DATA 85,07        :REM          STA XREG
1516 DATA 20,CD,02     :REM          JSR JSRFAR        ;COMPARE THE TWO BYTES
1517 DATA A4,08        :REM          LDY YREG          ;  AND EXIT WITH Y REG-
1518 DATA A5,05        :REM          LDA SREG          ;  ISTER RECOVERED AND
1519 DATA 48           :REM          PHA               ;  COMPARISON RESULT
1520 DATA 28           :REM          PLP               ;  ETCHED IN STATUS
1521 DATA 60           :REM          RTS               ;  REGISTER
1522 :
1523 :                  REM   SUBROUTINE TO LOCATE REQUIRED ELEMENT OF ARRAY
1524 :                  REM   IN BANK 1.  ON ENTRY, VARPTR MUST ADDRESS ZERO
1525 :                  REM   ELEMENT OF ARRAY AND FBUFPT MUST CONTAIN NUMBER
1526 :                  REM   OF SOUGHT ELEMENT.  CALLS FDLMNT IN BANK 15.
1527 :                  REM   ON EXIT, VARPTR -> SOUGHT ELEMENT.
1528 :
1529 DATA A9,0F        :REM   FIND   LDA #15
1530 DATA 85,02        :REM          STA BANK
1531 DATA A9,7E        :REM          LDA #>FDLMNT
1532 DATA 85,03        :REM          STA PCHI
1533 DATA A9,1C        :REM          LDA #<FDLMNT
1534 DATA 85,04        :REM          STA PCLO
1535 DATA A9,01        :REM          LDA #1
1536 DATA 85,07        :REM          STA XREG
1537 DATA 4C,CD,02     :REM          JMP JSRFAR
1538 :
1539 :                  REM   SUBROUTINE TO UNPACK AND MOVE A REAL VARIABLE
1540 :                  REM   ADDRESSED ON ENTRY BY A,Y TO FLOATING POINT
1541 :                  REM   ACCUMULATOR.
1542 :
```

```
1543 DATA 85,24      :REM   MOVE   STA INDEX       ;INDEX -> VARIABLE
1544 DATA 84,25      :REM          STY INDEX+1
1545 DATA A0,04      :REM          LDY #4          ;PACKED LENGTH IS
1546 DATA 84,08      :REM          STY YREG        ;  5 BYTES
1547 DATA 20,0F,16   :REM          JSR MOVE3       ;FETCH MANTISSA LOBYTE
1548 DATA 85,67      :REM          STA FACLO
1549 DATA 20,0D,16   :REM          JSR MOVE2       ;FETCH MANTISSA MIDDLE
1550 DATA 85,66      :REM          STA FACMO       ;  ORDER LOBYTE
1551 DATA 20,0D,16   :REM          JSR MOVE2       ;FETCH MANTISSA MIDDLE
1552 DATA 85,65      :REM          STA FACMOH      ;  ORDER HIBYTE
1553 DATA 20,0D,16   :REM          JSR MOVE2       ;FETCH MANTISSA HIBYTE
1554 DATA 85,68      :REM          STA FACSGN      ;  AND ISOLATE SIGN
1555 DATA 09,80      :REM          ORA #128
1556 DATA 85,64      :REM          STA FACHO
1557 DATA 20,0D,16   :REM          JSR MOVE2       ;FETCH EXPONENT BYTE

1558 DATA 85,63      :REM          STA FACEXP
1559 DATA A0,00      :REM          LDY #0          ;ZERO OVERFLOW AND EXIT
1560 DATA 84,71      :REM          STY FACOV
1561 DATA 60         :REM          RTS
1562 DATA C6,08      :REM   MOVE2  DEC YREG        ;DOWNDATE INDIRECTION
1563 DATA A9,24      :REM   MOVE3  LDA #<INDEX     ;INDEX -> VARIABLE!
1564 DATA 85,06      :REM          STA AREG
1565 DATA 20,8B,15   :REM          JSR FETCH       ;FETCH INDICATED BYTE
1566 DATA A5,06      :REM          LDA AREG        ;EXIT WITH BYTE IN A
1567 DATA 60         :REM          RTS•
1568 :
1569 :                REM   SUBROUTINE TO COMPARE FLOATING POINT VARIABLE
1570 :                REM   ADDRESSED ON ENTRY BY A,Y WITH UNPACKED VALUE
1571 :                REM   IN FLOATING POINT ACCUMULATOR.  ON EXIT,
1572 :                REM   A = 1 IF FAC > (A,Y)
1573 :                REM   A = 0 IF FAC = (A,Y)
1574 :                REM   A =-1 IF FAC < (A,Y)
1575 :                REM   STATUS FLAGS ARE SET ACCORDINGLY.
1576 :
1577 DATA 85,26      :REM   COMP   STA INDEX2      ;INDEX2 -> VARIABLE
1578 DATA 84,27      :REM          STY INDEX2+1
1579 DATA A0,00      :REM          LDY #0
1580 DATA 84,08      :REM          STY YREG
1581 DATA 20,76,16   :REM          JSR COMP8
1582 DATA E6,08      :REM          INC YREG
1583 DATA AA         :REM          TAX
1584 DATA 86,FA      :REM          STX STORE
1585 DATA F0,3B      :REM          BEQ COMP3
1586 DATA 20,76,16   :REM          JSR COMP8
1587 DATA 45,68      :REM          EOR FACSGN
1588 DATA 30,38      :REM          BMI COMP4
1589 DATA A6,FA      :REM          LDX STORE
1590 DATA E4,63      :REM          CPX FACEXP
1591 DATA D0,26      :REM          BNE COMP2
1592 DATA 20,76,16   :REM          JSR COMP8
1593 DATA 09,80      :REM          ORA #128
1594 DATA C5,64      :REM          CMP FACHO
1595 DATA D0,1D      :REM          BNE COMP2
1596 DATA 20,74,16   :REM          JSR COMP7
1597 DATA C5,65      :REM          CMP FACMOH
1598 DATA D0,16      :REM          BNE COMP2
1599 DATA 20,74,16   :REM          JSR COMP7
1600 DATA C5,66      :REM          CMP FACMO
1601 DATA D0,0F      :REM          BNE COMP2
1602 DATA E6,08      :REM          INC YREG
1603 DATA A9,7F      :REM          LDA #127
1604 DATA C5,71      :REM          CMP FACOV
1605 DATA 08         :REM          PHP
1606 DATA 20,76,16   :REM          JSR COMP8
1607 DATA 28         :REM          PLP
1608 DATA E5,67      :REM          SBC FACLO
1609 DATA F0,15      :REM          BEQ COMP6
1610 DATA A5,68      :REM   COMP2  LDA FACSGN
1611 DATA 90,0A      :REM          BCC COMP5
1612 DATA 49,FF      :REM          EOR #255
1613 DATA B0,06      :REM          BCS COMP5
1614 DATA A5,63      :REM   COMP3  LDA FACEXP
1615 DATA F0,09      :REM          BEQ COMP6
1616 DATA A5,68      :REM   COMP4  LDA FACSGN
1617 DATA 2A         :REM   COMP5  ROL A
1618 DATA A9,FF      :REM          LDA #255
1619 DATA B0,02      :REM          BCS COMP6
1620 DATA A9,01      :REM          LDA #1
1621 DATA 60         :REM   COMP6  RTS
1622 DATA E6,08      :REM   COMP7  INC YREG
1623 DATA A9,26      :REM   COMP8  LDA #<INDEX2
1624 DATA 85,06      :REM          STA AREG
1625 DATA 20,8B,15   :REM          JSR FETCH
1626 DATA A5,06      :REM          LDA AREG
```

```
1627 DATA 60         :REM          RTS
1628 :
1629 :                REM   HERE COMMENCES THE DATA BLOCK INTO WHICH YOU
1630 :                REM   WILL POKE THE VALUES WHICH WILL INITIALISE
1631 :                REM   THE SORT PARAMETERS.
1632 :
1633 DATA 00,00      :REM   ARYLST .WOR 0          ;NAME OF KEY ARRAY
1634 DATA 00,00      :REM          .WOR 0          ;ADDRESS OF KEY ARRAY
1635 DATA 00,00      :REM          .WOR 0          ;NAME OF ARRAY 2
1636 DATA 00,00      :REM          .WOR 0          ;ADDRESS OF ARRAY 2
1637 DATA 00,00      :REM          .WOR 0          ;NAME OF ARRAY 3
1638 DATA 00,00      :REM          .WOR 0          ;ADDRESS OF ARRAY 3
1639 DATA 00,00      :REM          .WOR 0          ;NAME OF ARRAY 4
1640 DATA 00,00      :REM          .WOR 0          ;ADDRESS OF ARRAY 4
1641 DATA 00         :REM   ARRAYS .BYT 0          ;# OF ARRAYS TO SORT
1642 DATA 00,00      :REM   TOTAL  .WOR 0          ;# OF ELEMENTS IN ARRAYS
1643 DATA 00         :REM   FLAG   .BYT 0          ;SORT DIRECTION, ETC.
1644 :
1645 :                REM   ADDITIONAL STORAGE USED BY ROUTINE
1646 :
1647 DATA 00         :REM   SWPFLG .BYT 0
1648 DATA 00,00      :REM   LIMIT  .WOR 0
1649 DATA 00,00      :REM   UPPER  .WOR 0
1650 DATA 00,00      :REM   LOWER  .WOR 0
1651 DATA 00,00      :REM   GAP    .WOR 0

READY.
```

AD INDEX

END

THANKS FOR THE MEMORIES

Ever notice how time seems to change everything? Fashions change. Technology changes. Even the computers we use change. Maybe that's why so many of our customers are saying goodbye to IBM in favor of a "good buy" from Wells American.

As time goes by, more and more computer users are realizing what an extraordinary value our A★Star II® truly is. It's the *only* AT class microcomputer that can run at 6, 8, 10 *and* 12 MHz! It's also the *only* PC/AT compatible that's "network ready." Better yet, each A★Star II now comes with your choice of keyboards - the original AT version or the enhanced "RT" style. Best of all, A★Star II prices are unbelievably low!

But what about quality and support? Don't worry! We've been making microcomputers *longer* than IBM! And it shows. Our A★Star® computers have been top rated by leading industry trade journals. Even so, we've heard that some "big blue" old-timers still worry about trading their IBM "security" blanket for better priced, higher performance equipment. (Remember how difficult it was to give up *your* baby blanket?)

THE A★STAR II IS MADE IN THE USA.

That's why we've arranged for our A★Star II to be distributed and supported in your area by a select group of only the finest computer dealers. And it's why we back each unit with a no risk, 31 day money-back guarantee.

Still need a blanket? We've got you covered! Try out one of our A★Star II's and we'll send you one. It's baby blue, monogrammed. . .and absolutely free! This offer *is* limited, so call or write us today for the name of your nearest authorized dealer. Just because you'll be saying goodbye to IBM doesn't mean you'll have to say goodbye to quality, support *or* security. Besides, at least you'll still have your memories... and your money!

Wells American.

International Sales Office: Post Office Box 5479 • Nicosia, Cyprus • 02-461748 • TLX 3977CY
Corporate Headquarters: 3243 Sunset Boulevard • West Columbia, South Carolina 29169 • 803/796-7800 • TWX 510-601-2645

IBM, Personal Computer AT and AT are trademarks of International Business Machines.

Sole Australian Agents:

KCM Computers Pty Ltd

380 Victoria Street, Richmond Vic 3121 Australia Tel: (03) 429 2733 Tlx: AA39766

Distributors: Sydney (02) 957 6358 Newcastle (049) 675 266 Canberra (062) 97 8960 Perth (09) 325 9088 Brisbane (07) 356 7866
Val Sims, The Manager, Ken Tuffee & Co., Ph: (08) 258 4538

Nationwide warranty by KCM and 3M Australia.